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ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 1] [1921

I.—A REVISION OF THE AUSTRALIAN SPECIES OF STIPA.

D. K. HUGHES.

A few months ago an inquiry concerning certain Australian species of *Stipa* of the *S. scabra* group was addressed to Kew. This necessitated, in the first place, comparison with the original of *S. scabra*, which was described very briefly by Lindley from a specimen collected by Mitchell (No. 125) on the Bogan River, New South Wales, and now in the Lindley Herbarium in Cambridge. Professor Seward was kind enough to send it to Kew so that a careful collation with the specimens referred by Bentham to *S. scabra* was possible. This resulted in the recognition of Mitchell's type as distinct from much of the material at Kew under that name. Very probably Bentham had never seen it, as he placed it in the group with "Ligules short, ciliate," whilst Mitchell's plant has quite conspicuous ligules over 3 mm. long. Nor do the specimens quoted by Bentham form a homogeneous group. The attempt to place the elements composing it into their proper species showed that most of the species which were drawn upon for comparison consisted of equally incongruous parts, so that nothing but a complete revision of the Australian species of *Stipa* could solve the problem. This Miss Hughes undertook under my supervision, with the result laid down in the present paper.

The admission of 40 species in the place of the 15 species of the Flora Australiensis may seem startling, the more so as only five species distinguished here are based on material unknown to Bentham. In some cases old species have been re-established, in others more recent collections brought out characters which were not so obvious in the older sets; but on the whole the explanation must be sought in the admittedly liberal conception of species characteristic of the author, a conception which in this, as in all pioneer work of that kind, may be looked upon as an almost unavoidable condition for

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completion within a practicable time. It is like the bold treatment of the first cast of a monumental work and, rightly and fairly understood, does not detract from the value of the work or the genius of the author. On the other hand, it challenges by its very nature the criticism of the specialist who is called upon to supply the more minute details with a view towards a final recognition of the taxonomic structure of the group. Neither the material available, nor the insight which we possess into the real value of the differences which present themselves in specimens mostly collected in a haphazard way, badly annotated, if at all, and frequently imperfect in some respects, warrants a claim to that finality having been reached. It is evident that nothing but painstaking and comprehensive analysis and the avoidance of unsupported generalisation can lead to the desired goal.

It is hoped that it is in this sense that the Australian botanists, working at the sources of our knowledge of those grasses, will receive this attempt at unravelling the threads of an unusually intricate taxonomic problem.

In explanation of the procedure adopted, I may add that the grouping of the species as it appears in the Key that precedes the Enumeration of the Species was obtained almost entirely from the comparison of external morphological characters such as a careful and catholic analysis revealed. Groups of wider and narrower extent presented themselves, and those which could not be further analysed without drifting away from apparently stable and therefore reliable characters were accepted as species. Some of the wider groups were obvious enough to be recognised at a glance, others less definitely circumscribed, suggested themselves in the first place through their more marked members which were found to form nuclei round which others clustered more or less evidently. Out of this combination of analysis and synthetic perception the Key grew almost automatically. The differentiation thus revealed of the whole plexus of forms under consideration rests, therefore, on a purely empirical basis such as might be expected to reflect natural relationships.

It was not until after the drafting of the Key was completed that I suggested that the result obtained should be tested by reference to the anatomical characters of the leaf-blades, partly to see how they compared with the grouping as it manifested itself through the external characters, and partly to gain additional data which might assist in the recognition of the species. The result of Miss Hughes' work in that direction is embodied in the text figures on pp. 19 and 29. The common experience that the variation of the anatomical structure of the leaf-blade of the grasses does not generally run parallel with the characters from which we infer their phylogenetic relationships, although they add frequently to the distinctiveness of the species, also holds good in the present case. Only one group (*Sclerophyllæ*)

stands out markedly from the rest, and even in that case the concept of the group rests largely on an external character (junciform leaf-blades), of which the anatomical character is but a paraphrase. Apart from this group, the anatomical structure of the leaf-blades varies on the whole within narrow limits, so that it will frequently be found useful as an ancillary character. To introduce these anatomical details into the Key, beyond the most marked instances, would have encumbered it unnecessarily without adding more than can be gleaned from the figures, which are at least as expressive as a description For the same reason I have advised Miss Hughes to desist from the incorporation of anatomical matter in her descriptions of new species.

The concurrent numbering of the species in the Key and Enumeration and of the figures will materially facilitate reference to the latter.

It was very tempting to extend the study to the problem of the relationship of the Australian *Stipæ* with their congeners in other parts of the world, the more so as the distribution of *Stipa* is very singular, but to do so would have entailed the revision of a larger amount of material and literature than was feasible. It may suffice to state in this place that there is no evident connection with the only undoubtedly indigenous South African species (*S. Dregeana*), and no striking relationship with the American species. On the other hand, the only two annual species are closely linked up with the Mediterranean *S. tortilis*.

O. Stapf.

Key to the Groups and Species.

The numbers of the species in the Key correspond to those of the Enumeration and of the figures. (The letters after the numbers on pp. 19 and 29 should read A instead of *a* in accordance with the quotations in the text.)

Valvule very small, rarely half as long as the valve, this glabrous or slightly hairy at the base, minutely scaberulous upwards; leaf-blades flat or involute without a continuous sclerenchymatic hypoderma, girders all percurrent or alternately percurrent and interrupted - - I. **Micropaleatae.**

Valvule as long as the valve or almost so; valve silky hairy mostly all along:

Hyaline margins of the valve produced at the tip into a small lobe on each side of the awn, lobes acute or acuminate, not less than 0·5 mm. long:

Leaf-blades reduced or quite rudimentary; stems hard and woody; spikelets 2·6 mm. long - - - - II. **Aphyllae.**

Leaf-blades hard, junciform to subulate or setaceous, with a continuous sclerenchymatic hypoderma on both sides and strong percurrent girders, mesophyll much reduced; plants 60–90 cm. high; glumes 0·9–1·5 cm. long; valve mostly densely hairy, rarely glabrescent or puberulous upwards - - - III. **Sclerophyllae.**

Hyaline margins of the valve not produced into lobes, or, if so, then the lobes quite inconspicuous and obtuse, rarely more distinct (nos. 10 and 16), often only one developed; leaf-blades without a continuous sclerenchymatic hypoderma or only on the lower side, and then mostly very thin; girders alternately percurrent and dorsal or all percurrent :

*Perennial :

Bristle of the awn sharply recurved like a scythe or reaping hook; glumes delicate and hyaline at least towards the tips - - IV. **Falcatae.**

Bristle of the awn slightly curved or straight, often twice geniculate :

Awn plumose either in the upper or lower part; hairs up to 4 mm. long - V. **Plumosae.**

Awn apparently glabrous or pubescent, but not plumose :

Lateral nerves of lower glume continuing nearly the whole of its length and as prominent as the dorsal, giving the spikelets a striate appearance :

Glumes straight or upwards very gently incurved, not bulging below and arching over the floret, which is not or only slightly turgid - - VI. **Striatae.**

Glumes slightly recurved upwards bulging below and arching over the turgid floret, rather firm, 0·8–1·4 cm. long; awn twice geniculate up to 3·5 cm. long - - VII. **Turgidulae.**

Lateral nerves of lower glumes very faint or obsolete, usually present only at the base, therefore the glume not striate, delicate - VIII. **Aphanoneurae.**

Annual, or at least with no trace of a rhizome, sometimes with lateral tufts of leafy shoots at the base, the lowest sheaths of which are blade-bearing; glumes membranous, greenish, somewhat glistening - IX. **Annuae.

I. **Micropaleatae.**

Branches of the panicle long-plumose; spikelets 1–1·4 cm. long; leaves and sheaths finely scaberulous or quite smooth, rarely pubescent; girders percurrent - - - 1. *elegantissima.*

Branches of the panicle very shortly hairy; spikelets 9 mm. long; leaves densely pubescent; girders alternately percurrent and interrupted - - - - 2. *Tuckeri.*

II. **Aphyllae.**

Only species - - - - 3. *Muelleri.*

III. **Sclerophyllae.**

Valve densely hairy all over, lobes ciliate; leaf-blades stiff, junciform or subulate, quite smooth or almost so :

Hairs of valve whitish, about 2 mm. long; leaf-blades about 60 cm. long, very hard, quite smooth, oval in cross-section and tightly complicate :
Glumes about 0·9 cm. long, acute, usually yellowish brown; valve 0·7 cm. long - - 4. *juncifolia.*
Glumes 1·7–1·8 cm. long, acuminate, white, hyaline; valve 1·2 cm. long - - - 5. *teretifolia.*
Hairs of valve fulvous, not over 1 mm. long; leaf-blades usually much shorter than in the preceding species, loosely convolute and rather soft, smooth or very finely scaberulous; glumes 1·1–1·3 cm. long - - 6. *flavescens.*
Valve scantily hairy, glabrescent or scaberulous towards the tip, lobes glabrous; glumes 1·3–1·4 cm. long; blades setaceous, flexuous - 7. *oligostachya.*

IV. **Falcatae.**

Glumes 1·6–2 cm. long, finely scabrid all over :
Base of stem bulbous and woolly; leaf-blades scabrid, flexuose to cirrhiform, with a marked dorsal sclerenchymatic hypoderma; awn up to 10 cm. long - 8. *eriopus.*
Base of stem neither bulbous nor woolly; awn much shorter :
Leaf-blades smooth or scaberulous; awn up to 7 cm. long - 9. *tenuifolia.*
Leaf-blades very scabrid; awn 4·5–5 cm. long - - 10. *leptophylla.*
Glumes 0·7–1·4 cm. long, smooth; awns 4–9 cm. long :
*Ligule not over 1 mm. long, usually represented only by a ciliate rim :
Plants slender and delicate up to 45 cm. high, the basal sheaths very short, 1–3 (rarely 4) cm. long :
Glumes 1·1–1·4 cm. long, entire; leaf-blades scabrid or hairy :

Leaf-blades conspicuously and reversedly hairy; basal sheaths 2–3 cm. long, bright orange-coloured - 11. *trichophylla.*

Leaf-blades scabrid; basal sheaths 1–1·5 cm. long, pale - - - 12. *falcata.*

Glumes 0·7 cm. long, shallowly notched at the tip; leaf-blades scabrid - - 13. *arachnopus.*

Plants usually rather stout and well over 60 cm. high, the basal sheaths 4–6 cm. long:

Glumes 0·9–1·5 cm. long; valve hairy all along; awn about 6 cm. long; panicle up to 30 cm. long:

Leaves very hard and convolute, glabrous or finely scaberulous; panicle slender, the branches short, 3–6 flowered - - 14. *variabilis.*

Leaves softer than in *S. variabilis*, these as well as the sheaths shortly and densely pubescent all over; panicle dense, contracted, branches usually many flowered - - 15. *Drummondii.*

Glumes 1·5 cm. long; valve hairy below, scaberulous upwards; awn about 9 cm. long; panicle rarely over 15 cm. long - 16. *incurva.*

**Ligule elongated, 3–6 mm. long; blades and sheaths glabrous, sometimes slightly scabrid:

Awn about 8 cm. long, the column very slender, the bristle distinctly flattened; culms woody, about 90 cm. high - - - - 17. *platychaeta.*

Awn not over 6 cm. long, the column stouter than the bristle, which is not distinctly flattened; culms not more than 45 cm. high :
Culms compressible; blades and sheaths rather soft, slightly scabrid; awn up to 6 cm. long - - - - 18. *scabra.*
Culms wiry; leaf-blades hard, stiff, junciform, quite smooth and glabrous, awn not over 4 cm. long - - - 19. *pycnostachya.*

V. Plumosae.

Glumes about 1·5 cm. long; valve 0·6 cm. long; awn 3–4 cm. long :
Glumes pubescent; column of awn plumose on all sides, hairs up to 1 mm. long; bristle scaberulous - - - - 20. *densiflora.*
Glumes glabrous; column and bristle of awn unilaterally plumose, hairs up to 4 mm. long - - 21. *hemipogon.*
Glumes 1·7–2·4 cm. long; valve 0·8–1 cm. long; awn 7–9 cm. long :
Awn slender, column 1·4–3 cm. long, bristle 3–7 cm. long :
Awn white plumose along the column and base of the bristle, scaberulous towards the tip; hairs of the valve whitish :
Valve scantily hairy all along, the hairs not produced at the tip into a conspicuous tuft :
Column 1·4 cm. long; bristle up to 5·5 cm. long (from W. Australia) - - 22. *nobilis.*
Column 2 cm. long, bristle 6–7 cm. long (from S. and E. Australia) - - 23. *mollis.*
Valve densely covered with silky hairs, the uppermost produced into a tuft 2–3 mm. long - - 24. *stuposa.*

Awn greyish plumose all along, column about 3 cm. long, bristle 6 cm. long; hairs of valve fulvous - - - 25. *plumigera.*

Awn rather stout, column 3·5 cm. long, bristle about 4·5 cm. long - 26. *semibarbata.*

VI. Striatae.

Lower glume 2·1–3 cm. long, truncate or toothed; awn stout, whitish, 6–8·5 (rarely 11) cm. long; glumes glabrous or rarely pubescent - 27. *pubescens.*

Lower glume 0·8–1·7 cm. long, acuminate, entire; awn 3·5–6·5 cm. long, slender, usually turning dark in colour:

Inflorescence very lax; lower glume 1·4–1·7 cm. long; valve 0·9–1 cm. long, finally turning very dark brown with fulvous indumentum - - - 28. *rudis.*

Inflorescence dense, contracted, spikelike; glumes 1–1·4 cm. long; valve 7–9 mm. long, usually pale with white hairs (except *S. compacta*):

Sheaths densely bearded at the mouths with long white silky hairs; nodes glabrous; glumes tinged with dull violet - 29. *hirsuta.*

Sheaths shortly pubescent or glabrous at the mouths, but not bearded; nodes shortly and softly pubescent:

Glumes 1–1·2 cm. long; panicle up to 25 cm. long; awn 4·5–5·5 cm. long:

Glumes narrowly contracted; valve 0·8 cm. long, slender, with whitish indumentum 30. *tenuiglumis.*

Glumes not contracted; valve 0·9 cm. long, rather stout, with fulvous indumentum when mature - - 31. *compacta.*

Glumes about 1·4 cm. long; panicle up to 45 cm. long; awn 5·5 cm. long - - 32. *elatior.*

VII. **Turgidulae.**

Nerves of lower glume running out into three sharp teeth about 3 mm. long; glumes about 0·8 cm. long - 33. *aristiglumis.*

Glumes entire, 1–1·4 cm. long:

Glumes 1·2–1·4 cm. long, acutely acuminate; panicle very lax, internodes up to 6 cm. long - 34. *fusiformis.*

Glumes 1 cm. long, acute to subobtuse; panicle rather dense, internodes up to 3 cm. long - 35. *puberula.*

VIII. **Aphanoneurae.**

Ligule elongated, glabrous, up to 6 mm. long; awn 4 cm. long, twice geniculate; plant glabrous - 36. *setacea.*

Ligule short, ciliate:

Lower glume 1·5 cm. long; valve 0·8 cm. long; awn 5 cm. long; plant shortly pubescent - - 37. *aphanoneura.*

Lower glume 1·1 cm. long; valve 0·4 cm. long; awn 4 cm. long; plant glabrous or scaberulous - 38. *crinita.*

IX. **Annuae.**

Leaf-sheaths glabrous; basal leaves soft, convolute, 2 mm. wide when flattened out - - - 39. *compressa.*

Leaf-sheaths, at least the lower, villous with short coarse whitish and brightly glistening hairs; basal leaves setaceously convolute, rather stiff - - - - 40. *lachnocolea.*

ENUMERATION.

*The specimens to be accepted as "Types" are marked *.*

1. **S. elegantissima,** *Labill.* Pl. Nov. Holl. i. 24, t. 29. (Figs. 1 & 1A, pp. 13 & 19.)

W. AUSTRALIA. Shark's Bay, *Gaudichaud;* Murchison River, *Oldfield;* Swan River, *Drummond* 139, 222, 958; Kauring near Greenhills, *G. W. Brown* 532, 537; Lake Cowcowing, *Koch* 1133, p.p.; Dowerin-Merriden, *Stoward* 299; near Coolgardie, *Spencer Moore;* S.W. of Queen Victoria Spring, Elder Exploring Expedition, *Helms;* King George's Sound, *Baxter;* and without precise locality, *Ince; Collie;* Isle of Carnac, *Preiss* Herb. No. 1847.

S. AUSTRALIA. Port Augusta, growing among bushes, *T. S. Lea;* Yayinga Mts., Victoria Expedition, Nov. 7th, 1860 (*coll.?*); "Central Australia," *Capt. Sturt; Mitchell* 67.

NEW SOUTH WALES. Wyalong, *Boorman;* Murray River, *Dallachy;* Murrumbidgee, *F. Mueller.*

TASMANIA. *Labillardière*.*

2. **S. Tuckeri,** *F. Muell.* Fragm. Phytog. Austr. xi. 129. (Figs. 2 & 2A, pp. 13 & 19.)

NEW SOUTH WALES. Mt. Boppy, *Boorman;* Nipigan, *Boorman;* Lachlan and Darling-River, *Tucker** (not seen).

3. **S. Muelleri,** *Tate,* Trans. Roy. Soc. S. Austral. vii. (1885) 70. (Fig. 3, p. 13.)

S. AUSTRALIA. Mount Lofty range, *Tate*.*

4. **S. juncifolia,** *Hughes,* nov. sp. (Figs. 4 & 4A: pp. 13 & 19.) *Perennis,* caespitosa, ad 1 m. alta. *Culmi* erecti, teretes, glabri, laeves, 2–3 nodi, nodis glabris valde exsertis. *Foliorum* vaginae firmae, strictae, laeves, leviter striatae; ligulae elongatae, ovatae, ad 7 mm. longae, glabrae; laminae lineares, convolutae, rigidae, in acumen pungens longe attenuatae, usque 64 cm. longae, glabrae. *Panicula* glabra, e summa vagina exserta, anguste contracta, spiciformis, 16–20 cm. longa; rami pauci, inaequales, pseudoverticillati, laeves, 6–10 flori, ad 6 cm. longi; internodia 3–6 cm. longa, laevia; pedicelli 2–6 mm. longi, apice leviter discoidei. *Spiculae* fulvae, 9 mm. longae. *Glumae* subaequales, membranaceae, acutae, glabrae, inferior 3-nervis, superior sub-5-nervis. *Valva* cylindrica, 7 mm. longa, tota hirsuta pilis albis ad 2 mm. longis, 5-nervis, biloba, lobis acutis 1·2–2 mm. longis; callus 1·5 mm. longus, acutus; arista 5 cm. longa, columna robustiuscula 1 cm. longa; valvula valvam subaequans, truncata, dorso hirsuta. *S. flavescens,* Benth. Fl. Austral. vii. 566 p.p. non Labill.

W. AUSTRALIA. Swan River, *Drummond* 4th Coll. 377*.

There is a great superficial similarity between this plant and *S. flavescens,* Labill., but the differences indicated in the key

appear to justify their being treated as distinct species. The specimens of both species in the Kew Herbarium are over-mature with practically all the florets shed.

5. **S. teretifolia,** *Steud.* Syn. Glum. i. 128. *Dichelachne stipoides,* Hook. f. Fl. N. Zeal. i. 294, t. 66; Fl. Tasman. ii. 112. (Figs. 5 & 5A, pp. 13 & 19.)

VICTORIA. Wilson's Promontory, *C. Stuart;* Point Lonsdale, *Tilden* 754.

TASMANIA. South Port, *C. Stuart;* George Town, *Gunn* 1490; Swanport, *Story* 18804.

"Forming tussocks growing in shingle at high water mark" (Gunn).

The species was originally described from a plant collected by D'Urville* at Western Port, Victoria. Although I have not seen it, there is no doubt as to its identity with the specimens quoted.

This plant is also found in New Zealand (*see* Cheeseman, Fl. N. Zeal. 857), growing abundantly in North Island in rocky or sandy places near the sea from the North Cape to the Bay of Plenty.

6. **S. flavescens,** *Labill.* Pl. Nov. Holl. i. 24, tab. 30. (Figs. 6 & 6A, pp. 13 & 19.)

TASMANIA. *Labillardière**.

7. **S. oligostachya,** *Hughes,* nov. sp. (Figs. 7 & 7A, pp. 13 & 19.) *Perennis,* caespitosa, ad 65 cm. alta. *Culmi* graciles, erecti, sublaeves, 2-nodi, ad nodos pubescentes, internodiis exsertis. *Foliorum* vaginae arctae, infimae hirsutae, summae glabrae, caeterae pubescentes vel glabrescentes; ligulae breves, dense ciliatae; laminae duriusculae, setaceo-convolutae, saepe recurvae, 12–20 cm. longae, glabrae vel leviter scabriusculae. *Panicula* laxa, pauciflora, valde exserta, 15–20 cm. longa; rami tenues, 2-5-flori, ad 7 cm. longi, minute scaberuli; pedicelli 0·6–1 cm. longi. *Spiculae* fulvae, ad 1·4 cm. longae. *Glumae* membranaceae, acutae vel acuminatae, glabrae; inferior 3-nervis, 1·4 cm. longa; superior 5-nervis, 1·2 cm. longa. *Valva* cylindrica, 9 mm. longa, luteo-hirsuta, superne scaberula, 5-nervis, biloba, lobis acutis 1·2 mm. longis glabris; callus 2 mm. longus, acutus; arista 5 cm. longa, columna bigeniculata subrobusta 2 cm. longa; valvula valvam aequans, dorso sparse pilosa.

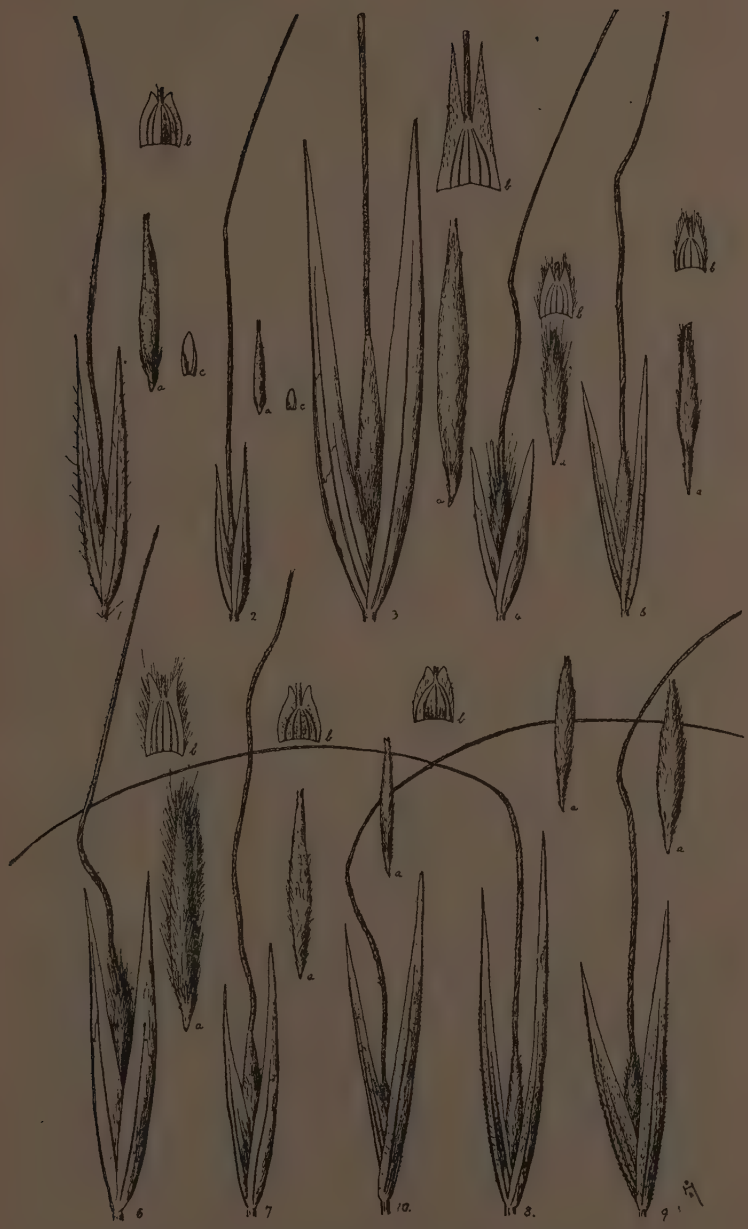
VICTORIA. Wendu Vale, growing in tussocks, *Robertson* 534*.

8. **S. eriopus,** *Benth.* Fl. Austral. vii. 570. (Figs. 8 & 8A, pp. 13 & 19.)

W. AUSTRALIA. Swan River, *Drummond* 962*.

9. **S. tenuifolia,** *Steud.* Syn. Glum. i. 128. *S. scabra,* var. *occidentalis,* Benth. Fl. Austral. vii. 571. (Figs. 9 & 9A, pp. 13 & 19.)

S.W. AUSTRALIA. Swan River, *Drummond* 220, 960, 963; and without precise locality, *Drummond* 391*.



Spikelets of species 1—10, × 3: *a*, valve; *b*, tip of valve · *c*, valvule. × 3.

There is a specimen in the Kew Herbarium written up "N.W. Coast, N. Holld. Bynoe," in Sir W. Hooker's hand. To this was added "rather Drummond," in pencil by Bentham, who, however, does not quote the locality in the Flora Australiensis. The specimen is certainly *S. tenuifolia*, but its origin is entirely doubtful.

10. **S. leptophylla,** *Hughes*, nov. sp. (Figs. 10 & 10A, pp. 13 & 19.) *Perennis*, caespitosa, 70–90 cm. alta. *Culmi* erecti, teretes, 2-nodi, nodis glabris exsertis. *Foliorum* vaginae arctae, glabrae, laeves, striatae, inferiores cinnamomeo-rufae; ligulae breves vel unilateraliter elongatae, ad 2 mm. longae, ciliatae; laminae filiformes, setaceo-convolutae, usque 25 cm. longae, scabrae. *Panicula* anguste contracta, spiciformis, 20–35 cm. longa; internodia 3–6 cm. longa, laevia; rami pseudo-verticillati, inaequales, leviter scaberuli; pedicelli 2–7 mm. longi, glabri vel leviter scaberuli. *Spiculae* angustatae, vix hiantes, ad 1·8 cm. longae. *Glumae* inaequales, apice hyalinae, acuminatae; inferior 1·8 cm. longa, 3-nervis, dorso scabriuscula; superior 1·5 cm. longa, sub-5-nervis. *Valva* angusta, 6·5 mm. longa, ciliata, pilis albis, 5-nervis, biloba lobis subacutis 1–1·5 mm. longis; callus acutus, 1·2 mm. longus; arista 4·5–5 cm. longa, columna robustiuscula 1–1·1 cm. longa, seta subplana; valvula valvam aequans.

W. Australia. Swan River, *Drummond* 381*.

11. **S. trichophylla,** *Benth.* Fl. Austral. vii. 570. (Figs. 11 & 11A, pp. 17 & 19.)

W. Australia. Kauring on the York-Greenhills Line, *Steward* 364, 458, 536; and without precise locality, *Drummond* 122*.

12. **S. falcata,** *Hughes*, nov. sp. (Figs. 12 & 12A, pp. 17 & 19.) *Perennis*, caespitosa, 30–45 cm. alta. *Culmi* erecti, 2-nodi, nodis glabris exsertis. *Foliorum* vaginae arctae, striatae, glabrae vel inferne subpubescentes, marginibus ciliatae; ligulae breves, dense ciliatae; laminae setaceo-convolutae, rigidulae, 4–8 cm. longae, scabrae. *Panicula* ad 25 cm. longa, 2–3 cm. lata; axis primarius subtriqueter, ut rami glaber; rami erecti vel sursum curvati, tenues, pauciflori, ad 5 cm. longi; pedicelli 0·2–1 cm. longi. *Spiculae* paulo hiantes, angustae. *Glumae* integrae, acuminatae, inaequales, delicatulae, basi violaceae, apice hyalinae; inferior 1·3 cm. longa, 3-nervis; superior 1·1 cm. longa, 5-nervis. *Valva* angusta, 6 mm. longa, parce albo-pilosa, 5-nervis, subintegra; callus acuminatus, 2·2 mm. longus, dense pilosus; arista 5·5–6 cm. longa, columna glabra vel minute scaberula 1·2 cm. longa, seta valde recurva; valvula valvam aequans. *S. setacea*, Benth. Fl. Austral. vii. 568 p.p. non R. Br.

W. Australia. Blackwood River, *Oldfield* 675.

N.S. Wales. Murrumbidgee, *McArthur* 141*.

Victoria. Mount M'Ivor, *Blandowski*.

13. **S. arachnopus,** *Pilg.* in Diels and Pritz. Fragm. Phytog. Austral. Occ. 70, in Engl. Jahrb. xxxv. e descr. *S. setacea*, Benth. Fl. Austral. vii. 586 p.p. non R. Br. (Figs. 13 & 13A, pp. 17 & 19.)

W. AUSTRALIA. Swan River, *Drummond* 136 (or 961?); Coolgardie, near Bullabulling, *Diels* 5954* (not seen).

14. **S. variabilis,** *Hughes*, nov. sp. (Figs. 14 & 14A, pp. 17 & 19.) *Perennis*, caespitosa, 30–80 cm. alta. *Culmi* erecti, teretes, 1–2-nodi, nodis glabris vel subpubescentibus plerumque exsertis. *Foliorum* vaginae arctae, striatae, glabrae, glabrescentes vel raro pubescentes; ligulae saepe unilateraliter elongatae, ad 2 mm. longae, ciliatae; laminae lineares, convolutae, subflexuosae, in acumen longe attenuatae, 5–15 (raro 25) cm. longae, glabrae, leviter scaberulae vel pubescentes. *Panicula* 15–25 cm. longa, usque 2–3 cm. lata; axis primarius laevis; rami magis minusve erecti, tenues, pauciflori, ad 9 cm. longi, scaberuli; pedicelli saepe curvati vel nutantes, 3–8 mm. longi, scaberuli. *Spiculae* paulo hiantes, 1·2–1·5 cm. longae. *Glumae* subaequales, acuminatae, membranaceae, basi plerumque violaceae, apice hyalinae; inferior sub-3-nervis; superior 5-nervis. *Valva* cylindrica, 6–8 mm. longa, albopilosa, 5-nervis, apice integra vel subintegra; callus acuminatus ad 2 mm. longus; arista 6–7 cm. longa, columna scaberula vel pubescente 11–14 mm. longa, seta valde recurva; valvula valvam aequans. *S. setacea*, Hook. f. Fl. Tasman. ii. 110, t. 157; Benth. Fl. Austral. vii. 568 p.p. non R. Br.; *S. scabra*, l. c. 571 p.p. non Lindl.; *S. pubescens* var. *effusa*, Benth l. c. 570.

W. AUSTRALIA. Kauring on the York-Greenhills Line, *Stoward* 361, 459, 466 p.p.; Swan River, *Drummond* 961*; Ningham Country beyond the Arrowsmith River, *Monger*.

S. AUSTRALIA? "Central Australia," *Sturt* 16, 17.

VICTORIA. Wendu Vale in large patches, *Robertson* 531; Yarra River, *Mueller;* Port Phillip, *MacGillivray* 880; Murray River, *Mueller*.

TASMANIA. Without precise locality, *Gunn* 1487.

The specimens enumerated here comprise a variety of forms, but none of them seem specifically distinct. The glumes vary slightly in length, but all have the same texture and shape. *Robertson* 531, from Victoria, is the only plant with the lower leaf sheaths pubescent, but it agrees in all other particulars. The species seems very closely allied to *S. Drummondii*, Steud., which differs merely in the very much denser panicle with longer and more divided branches, the usually straighter awn and the texture of the blades. In *S. variabilis* the blades are mostly glabrous and exceedingly hard, showing in cross section very prominent nerves with thin weak tissue between them, causing them to split up readily. (Fig. 14A, p. 19.) In *S. Drummondii* the blades are densely pubescent, much softer to cut and only loosely or sometimes hardly convolute, and the tissue between the nerves is thicker with no tendency to splitting. (Fig. 15A, p. 19.)

Further, the column of the awn of this species is usually conspicuously white pubescent.

15. **S. Drummondii** *Steud.* Syn. Glum. i. 128. *S. scabra* var. *auriculata*, Black in Trans. Roy. Soc. S. Austral. xlii. 169 (1918). (Figs. 15 & 15A, pp. 17 & 19.)

W. AUSTRALIA. Swan River, *Drummond;* without precise locality, *Drummond*, 4th coll. 378*.

S. AUSTRALIA. Laura, Oct. 8th, 1916, *Black;* Moonta, Nov. 24th, 1919, *Black;* Pinnaroo, Oct. 12th, 1918, *Black;* Enfield, Nov. 10th 1919, *Black;* Adelaide, *T. S. Lea.*

N.S. WALES. Bogan River, collected in the open forest, *Mitchell* 24.

16. **S. incurva,** *Hughes*, nov. sp. (Figs. 16 & 16A, pp. 17 & 19.) *Perennis*, caespitosa, ad 65 cm. alta. *Culmi* erecti, teretes, 2-nodi, nodis glabris rarius exsertis. *Foliorum* vaginae firmae, scabrae vel glabrae, striatae, summae plerumque tumidae, paniculae basin amplectantes; ligulae brevissimae, ciliatae; laminae lineares, convolutae, in acumen pungens attenuatae, ad 20 cm. longae, valde scabrae vel rarius scabriusculae. *Panicula* 10–15, raro 20 cm. longa, usque 1 cm. lata; rami erecti, striati, leviter scaberuli, ad 8 cm. longi; pedicelli 0·5–2 cm. longi, saepe nutantes. *Spiculae* paulo hiantes. *Glumae* integrae, acuminatae, subaequales, usque 1·5 cm. longae, basi violaceae, apice hyalinae; inferior 3-nervis, dorso leviter scaberula; superior 5-nervis, dorso laevis. *Valva* cylindrica, cum callo 7·5 mm. longa, inferne pilosa, superne scaberula, 5-nervis, biloba, lobis minutis obtusis; callus acutus, 2 mm. longus, dense pilosus; arista 9 cm. longa, columna glabra vel sparse pubescens 2 cm. longa, seta valde recurva; valvula valvam aequans. *S. scabra* var. *pubescens*, Benth. Fl. Austral. vii. 571.

W. AUSTRALIA. Swan River, *Drummond* 138, 375*, 973; *Collie;* York District, Killerberrim, *Leake;* Harvey, *Stoward* 533, 766.

VICTORIA. Nidesdale, *Etheridge,* June, 1865.

17. **S. platychaeta,** *Hughes*, nov. sp. (Figs. 17 & 17A, pp. 17 & 19.) *Perennis*, haud caespitosa, ad 1 m. alta. *Culmi* erecti vel subgeniculati, teretes, lignosi, glabri, laeves, usque 10-nodi, iterum ramosi vel subfasciculati, internodiis exsertis; ligulae elongatae, ad 5 mm. longae, membranaceae, glabrae; laminae lineares, in acumen longe attenuatae, planae, ad 15 cm. longae, 2–5 mm. latae, utrinque glabrae. *Panicula* glabra, demum exserta, laxa, ad 20 cm. longa; internodia ad 4 cm. longa; rami primo erecti, maturi obliqui, 3–4-flori, ad 5 cm. longi; pedicelli 0·3–1 cm. longi, flexuosi. *Spiculae* parce hiantes. *Glumae* inaequales, delicatulae, basi violaceae, apice hyalinae, acuminatae; inferior 3-nervis, 1·2–1·5 cm. longa; superior 5-nervis, 0·9–1·2 cm. longa. *Valva* fusiformis, cum callo 5 mm. longa, integra, breviter pilosa; callus brevis, ad 0·6 mm. longus; arista usque 8 cm. longa, columna tenui 1 cm. longa, seta valde recurva manifeste compressa; valvula valvam aequans.

Spikelets of species 11—20, × 3: *a*, valve, × 3; *b*, tip of lower glume; *c*, tip of upper glume, × 6.

W. Australia. Lake Cowcowing, *Koch* 1133 p.p.*; 80 m. N. of Coolgardie, *Menzies*, 1st coll. 1207; and without precise locality, *Ince* p.p.

S. Australia. Upper Arkaringa Valley, *Helms*.

N.S. Wales. Murrumbidgee, *Mueller*.

18. **S. scabra,** *Lindl.* in Mitch. Trop. Austral. 31. *S. setacea*, Benth. Fl. Austral. vii. 568, non R. Br. (Figs. 18 & 18a, pp. 17 & 19.)

W. Australia. Fraser's Range, *Dempster*.

S. Australia. Elder Exploring Expedition (about 131·30° E. 27° S.), *Helms;* Mt. Lyndhurst, growing on elevated country, tablelands, &c., *Koch* 371; Gawler River, *Mueller;* and without precise locality, *Sinclair*.

Queensland. Warwick, *Beckler*.

N.S. Wales. Castlereagh, *Woolls;* Bogan River, *Mitchell* 125*.

19. **S. pycnostachya,** *Benth.* Fl. Austral. vii. 568. (Figs. 19 & 19a, pp. 17 & 19.)

W. Australia. Swan River, *Drummond;* and without precise locality, *Drummond* 121*.

20. **S. densiflora,** *Hughes*, nov. sp. (Fig. 20, p. 17.) *Basis* incognita. *Culmus* florifer robustus, nodis parce exsertis brevissime pubescentibus. *Foliorum* vaginae arctae, striatae, breviter et dense pubescentes, summae tumidae paniculae basin amplectantes ; ligulae brevissime sparse ciliatae; laminae laxe convolutae, in acumen attenuatae, superiores usque 13 cm. longae, utrinque breviter pubescentes. *Panicula* densissima, contracta, elliptico-oblonga, usque 20 cm. longa, 4 cm. lata; rami iterum divisi, multiflori. *Spiculae* angustae, subherbaceae. *Glumae* acuminatae, subaequales, usque 1·6 cm. longae, breviter pubescentes, 3-nerves. *Valva* 6 mm. longa, indistincte biloba, sparse albo-pilosa; callus acutus, 3 mm. longus; arista ad 3·8 cm. longa, columna 1·6–1·8 cm. longa breviter plumosa pilis albis ad 1 mm. longis, seta recta scabriuscula; valvula valvam aequans.

Central Victoria. Without precise locality, *Etheridge**.

21. **S. hemipogon,** *Benth.* Fl. Austral. vii. 569. *S. semibarbata*, var. F. v. Muell. Fragm. Phytog. Austral. viii. 104. (Figs. 21 & 21a, pp. 23 & 29.)

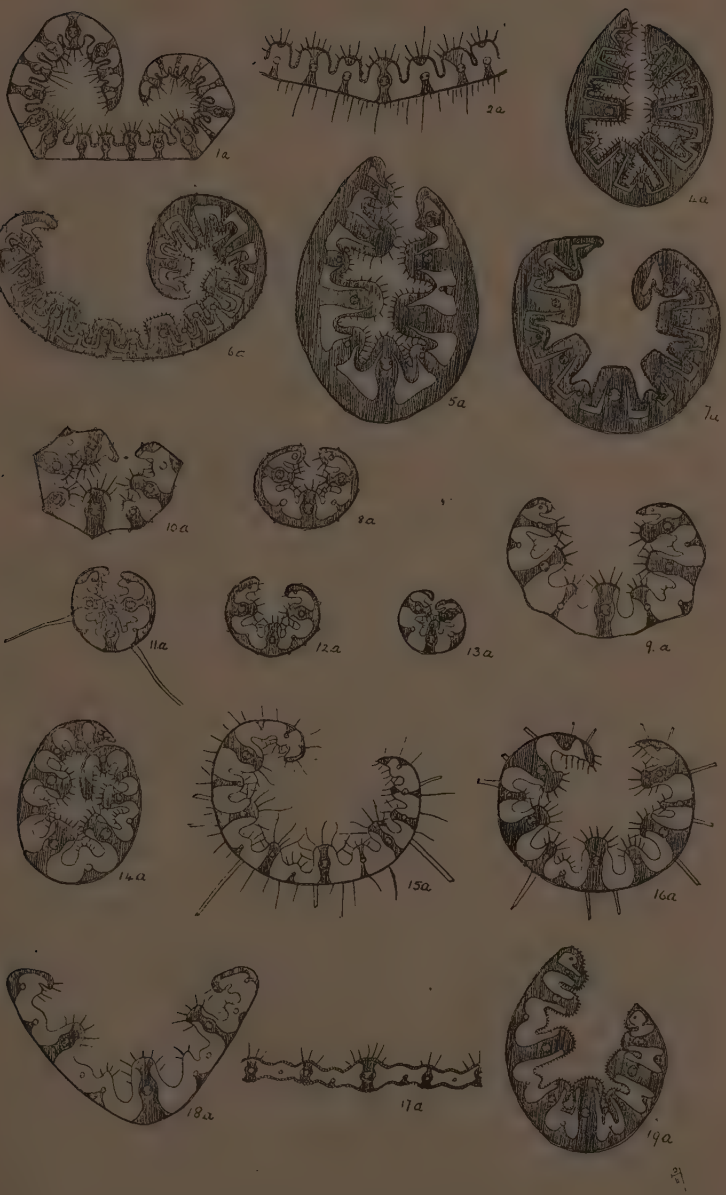
W. Australia. Swan River, *Drummond* 231, 376*; Lake Cowcowing, *Koch* 1132; Sikaltar District, *Spencer Moore*.

S. Australia. Garker's Range, *Mueller*.

22. **S. nobilis,** *Pilg.* in Diels and Pritz. Fragm. Phytog. Austral. Occ. 70 in Engl. Jahrb. xxxv. e descr. *S. semibarbata*, Benth. Fl. Austral. vii. 568, p.p. non R. Br. (Figs. 22 & 22a, pp. 23 & 29.)

W. Australia. Swan River, *Drummond* 116, 129; Kauring on the York-Greenhills Line, *Stoward* 474; Coolgardie, near Bronti, *Diels** (not seen).

23. **S. mollis,** *R. Br.* Prod. 174. *S. semibarbata*, Hook. f. Fl. Tasman. ii. 110 p.p. non R. Br.; Benth. Fl. Austral. vii.



Leaf sections of species 1—19, × 30.

569 p.p. non R. Br. *S. semibarbata*, var. *mollis*, Benth. l c. (Figs. 23 & 23A, pp. 23 & 29.)

N.S. WALES. Port Jackson, *Brown* 6205*; *Sieber*, *Agrostoth.* 60; *Kneucker* 196.

VICTORIA. Wendu Vale, forest land, *Robertson* 529; and without precise locality, *Harvey*.

TASMANIA. Port Dalrymple, *Paterson;* Hobart Town, *Gunn* 1452.

24. **S. stuposa,** *Hughes*, nov. sp. (Figs. 24 & 24A, pp. 23 & 29.) *Perennis*, vix caespitosa, ad 1 m. alta. *Culmi* erecti vel geniculati, teretes, 3-nodi, nodis exsertis molliter pubescentibus. *Foliorum* vaginae leviter striatae, praeter summas patule pubescentes, bases tandem in fibras longissimas tortas dissolutae; ligulae brevissimae, ciliatae; laminae lineares, convolutae, in acumen longe attenuatae, ad 20 cm. longae, patule pubescentes vel scabrae. *Panicula* angusta, contracta, ad 20 cm. longa; axis primarius teres, laevis; rami tenues, scabri, internodia vix excedentes, ad 10 cm. longi; pedicelli scabri, 2–8 mm. longi. *Spiculae* paulo hiantes, pallidae. *Glumae* inaequales vel subaequales, tenuiter acuminatae, membranaceae, apice longe hyalinae, dorso scaberulae; inferior 3-nervis, 1·7 cm. longa; superior 5-nervis, usque 1·5 cm. longa. *Valva* 1 cm. longa, integra, dense et manifeste hirta, pilis apice productis ad 3 mm. longis; callus acuminatus, 3 mm. longus; arista tenuis, non decidua, 5–6·5 cm. longa, columna breviter plumosa torta, 2·5 cm. longa; valvula valvam aequans.

TASMANIA. New Norfolk, *Gunn* 1480, Jan. 5th, 1840*; Port Arthur and Hobart Town, *Capt. Home.*

25. **S. plumigera,** *Hughes*, nov. sp. (Figs. 25 & 25A, pp. 23 & 29.) *Perennis*, caespitosa, usque 55 cm. alta. *Culmi* erecti, teretes, 2–3-nodi, nodis parce exsertis, molliter pubescentes. *Foliorum* vaginae arctae, leviter striatae, breviter pubescentes, marginibus oreque albo-ciliatae; ligulae non elongatae, dense ciliatae; laminae lineares, laxe vel vix convolutae, ad 35 cm longae, 2–3 mm. latae, supra breviter et dense pubescentes, infra glabrescentes. *Panicula* densa, contracta, usque 20 cm. longa; axis primarius teres, ut rami tenuiter scaberulus; pedicelli 1–5 mm. longi. *Spiculae* paulo hiantes, pallidae vel basi purpurascentes. *Glumae* inaequales, acuminatae, integrae, apice hyalinae; inferior 2 cm. longa, 3-nervis, dorso scaberula; superior 1·5 cm. longa, dorso laevis. *Valva* cylindrica, 8 mm. longa, hirsuta pilis fulvis; callus acuminatus, 3 mm. longus; arista gracillima, 9 cm. longa, columna et seta griseo-plumosis, pilis 1–1·5 mm. longis; valvula valvam aequans.

S. AUSTRALIA. Elder Exploring Expedition (about 130·80° E. 28° S.), *Helms**.

26. **S. semibarbata,** *R. Br.* Prod. 174. *S. semibarbata* var. *campylachne*, Benth. Fl. Austral. vii. 569 (Drummond specimen). (Figs. 26 & 26A, pp. 23 & 29.)

W. Australia. Swan River, *Drummond;* near Fremantle, among limestone hills, *Oldfield* 1004; "in arenosis silvae prope Pine-Apple, Perth," *Preiss* Herb. no. 1826; Leederville, *Stoward* 935; Gordon River, *Oldfield* 675; Bridgetown to Kojonup and Slab Hut Gulley, *Dorrien-Smith.*

S. Australia. Mt. Lofty Range, Belair, *Koch* 937; French Island, *Beveridge;* King George's Sound, *Collie.*

Tasmania. Penquite, *Gunn* 1480, Dec. 1845; Port Dalrymple, *Brown* 6204*.

S. campylachne, as described by Nees in Pl. Preiss. ii. 99, seems to be a plant with smaller spikelets (13–14 mm.) and shorter valves (6 mm.). I have not seen Preiss's specimen no. 1848 on which the species was primarily based, and am therefore doubtful as to its identity. Nees and Bentham (Fl. Austral. vii. 569) also quote a specimen of Drummond's from the Swan River under *S. campylachne* and *S. semibarbata* var. *campylachne*, respectively. The specimens of this variety as written up by Bentham himself are certainly identical with *S. semibarbata*, R. Br.

27. **S. pubescens,** *R. Br.* Prod. 174. *S. commutata*, Trin. and Rupr. Gram. Stip. 49. (Figs. 27 & 27A, pp. 23 & 29.)

Queensland. Brisbane River, *Cunningham.*

N.S. Wales. Port Jackson, *Brown* 6203*, *Sieber, Agrostoth.* 59; Blue Mountains, *Woolls* and *Calvert;* New England, *C. Stuart;* Sydney, *Stephenson* 261.

Tasmania. New Norfolk, *Gunn* 996 p.p.; Mount Direction, *Gunn;* Latrobe River, *Mueller;* Port Dalrymple, *Paterson;* and without precise locality, *Llotsky; Gunn* 588.

Gunn 588 and Mount Direction have somewhat more acuminate hyaline tips, but otherwise they agree well with *S. pubescens*, R. Br.

Under *Gunn* 996 there is a specimen dated 15.11.40, which agrees with another also by *Gunn* numbered 1453 and one by *Llotsky*, also from Tasmania, both having much stouter culms and broader leaf-blades than any of the specimens enumerated above. They are not *S. pubinodis*, Trin., and seem not to have been distinguished so far. They may represent a local race.

Variation occurs also in the length of the awns. In the type (*Brown* 6203) they measure 6–7·5 cm. long, while in one of *Llotsky's* specimens (without precise locality) they attain a length of 11 cm. This plant can hardly be called specifically distinct, as intergradations seem to exist between it and the type, so that I can only consider it as another example of a local variety or form.

28. **S. rudis,** *Spreng.* Syst. Cur. Post. 31. (Figs. 28 & 28A, pp. 23 & 29.) Descriptio emendata. *Perennis*, vix caespitosa, ad 1 m. alta. *Culmi* erecti vel geniculati, teretes, 2-nodi, nodis exsertis molliter pubescentibus. *Foliorum* vaginae leviter striatae, breviter pubescentes vel fere glabrae; ligulae brevissimae, glabrae vel minute ciliatae; laminae lineares, convolutae, in acumen longe attenuatae, ad 55 cm. longae, pubescentes vel glabrescentes.

Panicula angusta, contracta vel apertiuscula, ad 30 cm. longa; axis primarius teres, laevis; rami tenues, scabri, internodia vix excedentes, ad 9 cm. longi; pedicelli scabri, 2–8 mm. longi. *Spiculae* hiantes. *Glumae* subaequales, acuminatae, integrae vel subdentatae, apice hyalinae, ad 1·7 cm. longae; inferior 3-nervis; superior 5-nervis. *Valva* matura 1 cm. longa, integra, nigra vel fusca, sparse hirsuta pilis fulvis; callus acuminatus, 2 mm. longus; arista tenuis, matura nigrescens, 6·5–7 cm. longa columna breviter pubescente vel scaberula 2·5–3 cm. longa; valvula valvam aequans. *S. pubescens*, Benth. Fl. Austral. vii. 569 p.p., non R. Br.

W. Australia. Fremantle, among limestone hills, *Oldfield;* Leederville (near Perth), *Stoward* 586; Claremont, sandhills near the coast, *Cecil Andrews*, 1st coll., 1206; Swan River, *Collie*.

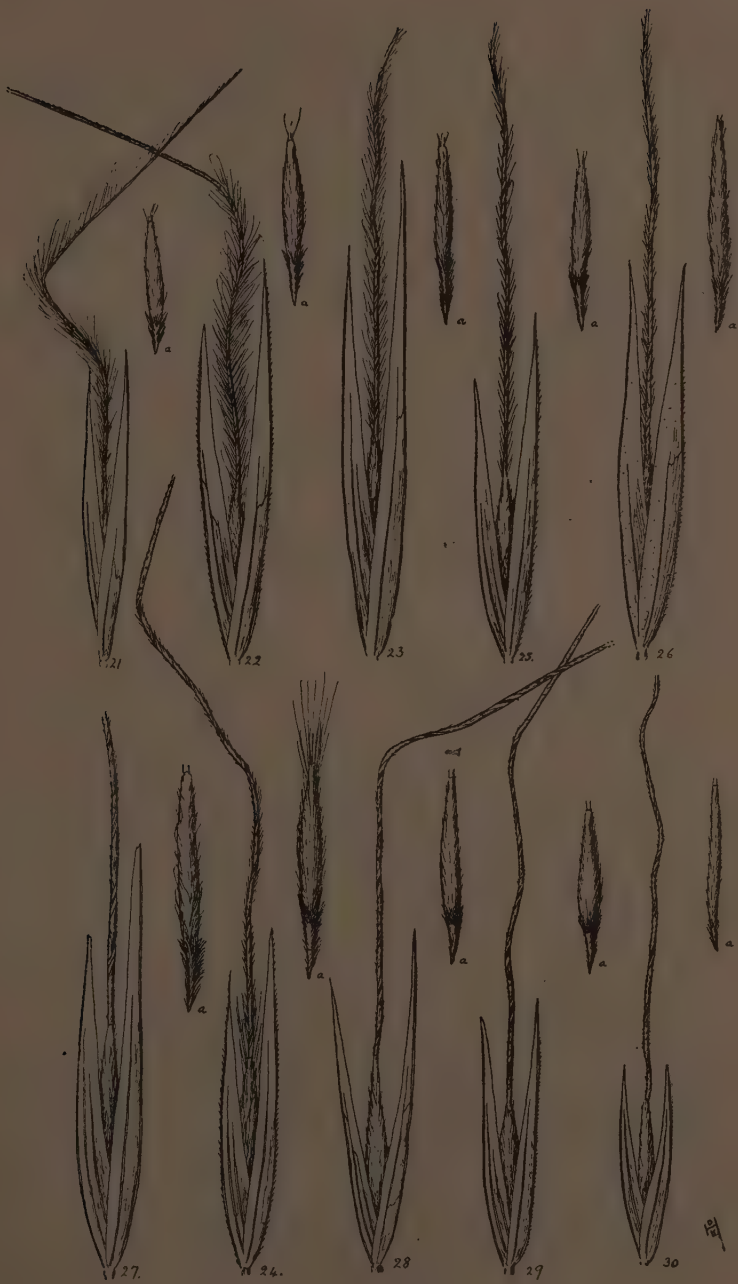
N.S. Wales. *Sieber* 66*.

Victoria. Wendu Vale, *Robertson* 533.

29. **S. hirsuta,** *Hughes*, nov. sp. (Figs. 29 & 29A, pp. 23 & 29.) *Perennis*, caespitosa, ad 60 cm. alta. *Culmi* erecti, teretes vel subcompressi, glabri, 2-nodi, nodis glabris exsertis. *Foliorum* vaginae arctae, striatae, sericeo-pilosae vel superiores glabrae, ore dense barbatae pilis albis ad 4 cm. longis; ligulae brevissimae, ciliatae; laminae lineares, convolutae, in acumen longe attenuatae, subflexuosae, ad 25 cm. longae, striatae, glabrae. *Panicula* angusta, contracta, spiciformis, ad 20 cm. longa; axis primarius teres, laevis; rami tenues, scabri, internodia vix excedentes, ad 10 cm. longi; pedicelli scabri, ad 4 mm. longi. *Spiculae* hiantes, purpurascentes. *Glumae* subaequales, acuminatae, integrae, apice hyalinae, usque ad 1·3 cm. longae; inferior 3-nervis, dorso scaberula; superior 5-nervis, nervis manifestis. *Valva* cylindrica, 8 mm. longa, luteo-brunnea, hirsuta pilis albis; callus acuminatus, ad 3 mm. longus; arista nigra, 5 cm. longa, columna breviter pubescente 1·7–2 cm. longa; valvula valvam aequans. *S. scabra*, Lindl. var. *barbata*, Benth. Fl. Austral. vii. 570.

W. Australia. Swan River, *Drummond**.

30. **S. tenuiglumis,** *Hughes*, nov. sp. (Figs. 30 & 30A, pp. 23 & 29.) *Perennis*, caespitosa, 50–60 cm. alta. *Culmi* erecti, teretes, glabri, laeves, 2-nodi, nodis glabris vix exsertis. *Foliorum* vaginae strictae vel apertiusculae, striatae, glabrae vel marginibus breviter ciliatae, summae interdum tumidae; ligulae brevissimae, sparse ciliatae; laminae lineares, convolutae, in acumen longe attenuatae, subflexuosae, ad 30 cm. longae, striatae, glabrae. *Panicula* densa, contracta, basi vaginata, 10–20 cm. longa, 1–3 cm. lata; axis primarius teres, laevis; rami filiformes, leviter scaberuli, ad 9 cm. longi; pedicelli 1–4 mm. longi. *Spiculae* hiantes, pallidae vel violaceae, striatae. *Glumae* exsiccatae tenues, acuminatae, integrae, subaequales, 1–1·2 cm. longae; inferior 3-nervis; superior 5-nervis. *Valva* pallide brunescens, tenuis, cum callo 8 mm. longa, sparse hirsuta pilis albis; callus acutus, 1 mm. longus; arista gracilis, 4·5 cm. longa, columna parce brevissima pilosula 2·5 cm. longa; valvula



Spikelets of species 21—30: *a*, valve. × 3.

valvam aequans. *S. scabra*, Lindl. var. *striata*, Benth. Fl. Austral. vii. 570.

W. Australia. Murchison River, Oolingarra, *Oldfield;* Sand near Woodman's Point, *Oldfield;* Swan River, *Drummond* 133*, 138 p.p.; Buckland Hill, near Perth, limestone hills, *Cecil Andrews*, 1st coll. 1205.

31. **S. compacta,** *Hughes*, nov. sp. (Figs. 31 & 31A, pp. 27 & 29.) *Perennis*, 60–80 cm. alta. *Culmi* erecti vel subgeniculati, teretes, laeves, usque 3-nodi, ad nodos pubescentes, caeterum glabri, internodiis inferioribus exceptis exsertis. *Foliorum* vaginae tandem laxiusculae, glabrae, leviter striatae; ligulae brevissimae, truncatae; laminae lineares, convolutae, in acumen longe attenuatae, 12–20 cm. longae (vel longiores ?), glabrae. *Panicula* exserta, densa, contracta, spiciformis, 18–30 cm. longa, ad 2 cm. lata; rami internodia vix vel paulo excedentes, usque 7 cm. longi; pedicelli 2–6 mm. longi, ut rami ramulique leviter scaberuli. *Spiculae* ad 1·2 cm. longae. *Glumae* subaequales, subhyalinae, acuminatae, glabrae; inferior 3-nervis; superior 5-nervis, nervis conspicuis. *Valva* fusiformis, 9 mm. longa, luteo-pilosa, 5-nervis, biloba, lobis acutis 1 mm. longis; callus 2·5 mm. longus, acuminatus; arista 5–6 cm. longa, columna bigeniculata 2·5–3 cm. longa; valvula valvam subaequans, dorso pilosa. *S. flavescens* Hook. Fl. Tasman. ii. 110, Benth. Fl. Austral. vii. 566 p.p. non Labill.

Tasmania. *Gunn* 996 p.p.*

32. **S. elatior,** *Hughes*, nov. sp. (Figs. 32 & 32A, pp. 27 & 29. *Perennis*, robusta, probabiliter caespitosa, usque ad 1 m. alta. *Culmi* erecti vel geniculati, teretes, 4-nodi, pubescentes, nodis exsertis. *Foliorum* vaginae apertae, striatae, molliter pubescentes, marginibus oreque breviter ciliatae; ligulae non elongatae, brevissime ciliatae; laminae lineares, vix convolutae, in acumen longe attenuatae, subflexuosae, ad 70 cm. longae, 5–7 mm. latae, striatae, utrinque sparse hirsutae vel glabrescentes. *Panicula* anguste contracta, basi vaginata, ad 40 cm. longa, usque 2 cm. lata; axis primarius subteres, glaber; rami filiformes, scaberuli, ad 15 cm. longi; pedicelli scaberuli, 1–4 mm. longi. *Spiculae* hiantes, pallidae. *Glumae* acuminatae, integrae, subaequales vel inaequales, glabrae; inferior 1·4 cm. longa, 3-nervis; superior ad 1·35 cm. longa, 5-nervis, nervis manifestis. *Valva* pallide brunnescens, tenuis, cum callo 7·5 mm. longa, sparse hirsuta pilis albis; callus acutus, 1 mm. longus; arista gracilis, 5·5 cm. longa, columna parce brevissime pilosula 2·5 cm. longa; valvula valvam aequans. *S. scabra*, Lindl. var. *elatior*, Benth. Fl. Austral. vii. 570.

W. Australia, Swan River, *Drummond;* and no. 959*; Harvey, *Stoward* 775; King George's Sound, *Brown* 6203, p.p.

S. Australia, Adelaide, *T. S. Lea.*

Tasmania, Port Dalrymple, *Paterson.*

33. **S. aristiglumis,** *F. Muell.* in Trans. Vict. Inst. 1855, 43. (Figs. 33 & 33A, pp. 27 & 29.)

VICTORIA, Murray River, *Mueller**.

34. **S. fusiformis,** *Hughes*, nov. sp. (Figs. 34 & 34A, pp.27 & 29.) *Perennis*, caespitosa, 50–70 cm. alta. *Culmi* erecti vel geniculati, teretes, fere lignosi, glabri, 3-nodi, nodis pubescentibus vel glabrescentibus valde exsertis. *Foliorum* vaginae apertiusculae, striatae, glabrae; ligulae non elongatae, truncatae, fere glabrae; laminae lineares, laxe convolutae, in acumen longe attenuatae, usque ad 15 cm. longae, glabrae. *Panicula* laxa, pauciflora, usque 25 cm. longa; axis primarius gracilis, leviter scaberulus, subtriqueter; rami fasciculati, patentes, ad 8 cm. longi, scaberuli, 4–6-flori; pedicelli 1–2 mm. longi. *Spiculae* subherbaceae. *Glumae* valde acuminatae, valvam amplectantes, subaequales, 1·2–1·4 cm. longae, integrae; inferior 3-nervis; superior 5-nervis. *Valva* cylindrica, turgida, 8 mm. longa, 1–1·5 mm. lata, integra, breviter et dense sericeo-pubescens pilis luteis; callus acutus, 1 mm. longus; arista 3 cm. longa, seta recta; valvula valvam aequans. *S. aristiglumis* Benth. Fl. Austral. vii. 570 non F. Muell.

N.S. WALES, Cassilis, *Leichardt.*

VICTORIA. Avoca River, *Mueller;* Murray River, *Mueller* 19277*.

35. **S. puberula,** *Steud.* Syn. Glum. i. 128. *S. scabra,* Lindl. var. *occidentalis*, Benth. Fl. Austral. vii. 571. (Figs. 35 & 35A, pp. 27 & 29.)

S.W. AUSTRALIA (without precise locality). *Drummond,* 4th coll. 379*.

36. **S. setacea,** *R. Br.* Prod. 174. (Figs. 36 & 36A, pp. 27 & 29.)

QUEENSLAND. Warwick, *Beckler.*

N.S. WALES. Port Jackson, *R. Brown,* 6202 p.p.*; New England, *C. Stuart;* Edward's River, *Mueller;* Castlereagh, *Woolls.*

Cheeseman (Man., N. Zeal. Fl. 858) cites this plant as found in New Zealand, but in his opinion it is probably only naturalised there.

37. **S. aphanoneura,** *Hughes*, nov. sp. (Figs. 37 & 37A, pp. 27 & 29.) *Perennis*, caespitosa, 30–60 cm. alta. *Culmi* erecti vel geniculati, teretes vel subcompressi, pubescentes, 2–4-nodi, nodis dense pubescentibus plerumque exsertis. *Foliorum* vaginae strictae vel apertiusculae, striatae, cinereo-pubescentes; ligulae non elongatae, dense ciliatae, ciliae ad 2·5 mm. longae; laminae lineares, convolutae, in acumen longe attenuatae, 10–20 cm. longae, utrinque tenuiter et densiuscula pubescentes vel glabrescentes. *Panicula* contracta, usque 20 cm. longa, 2–3 cm. lata; axis primarius gracilis, vix scaberulus; rami fasciculati, leviter scaberuli, ad 6 cm. longi; pedicelli 1–3 mm. longi. *Spiculae* angustae, delicatulae, pallidae. *Glumae* inaequales vel subaequales,

acuminatae, membranaceae; inferior sub 3-nervis, nervis lateralibus fere obsoletis, 1·5 cm. longa; superior manifeste 5-nervis, 1·2–1·4 cm. longa. *Valva* cylindrica, 8 mm. longa, pilosula pilis albis, 5-nervis, integra; callus acutus, 2 mm. longus; arista 5–6 cm. longa, columna leviter torta parce brevissime pilosula usque 2 cm. longa, seta recta vel subcurva scaberula; valvula valvam aequans. *S. flavescens*, Benth. Fl. Austral, vii. 566 p.p. non Labill.

S. Australia. Swanport, *Story*.

Victoria. Murray River, *Dallachy*.

Tasmania. Kent's Group, *Brown* 6202 p.p.*

38. **S. crinita,** Gaud. in Freyc. Voy. Bot. 407. (Fig. 38, p. 27.)

W. Australia. Shark's Bay, *Gaudichaud**; and without precise locality, *Caley*.

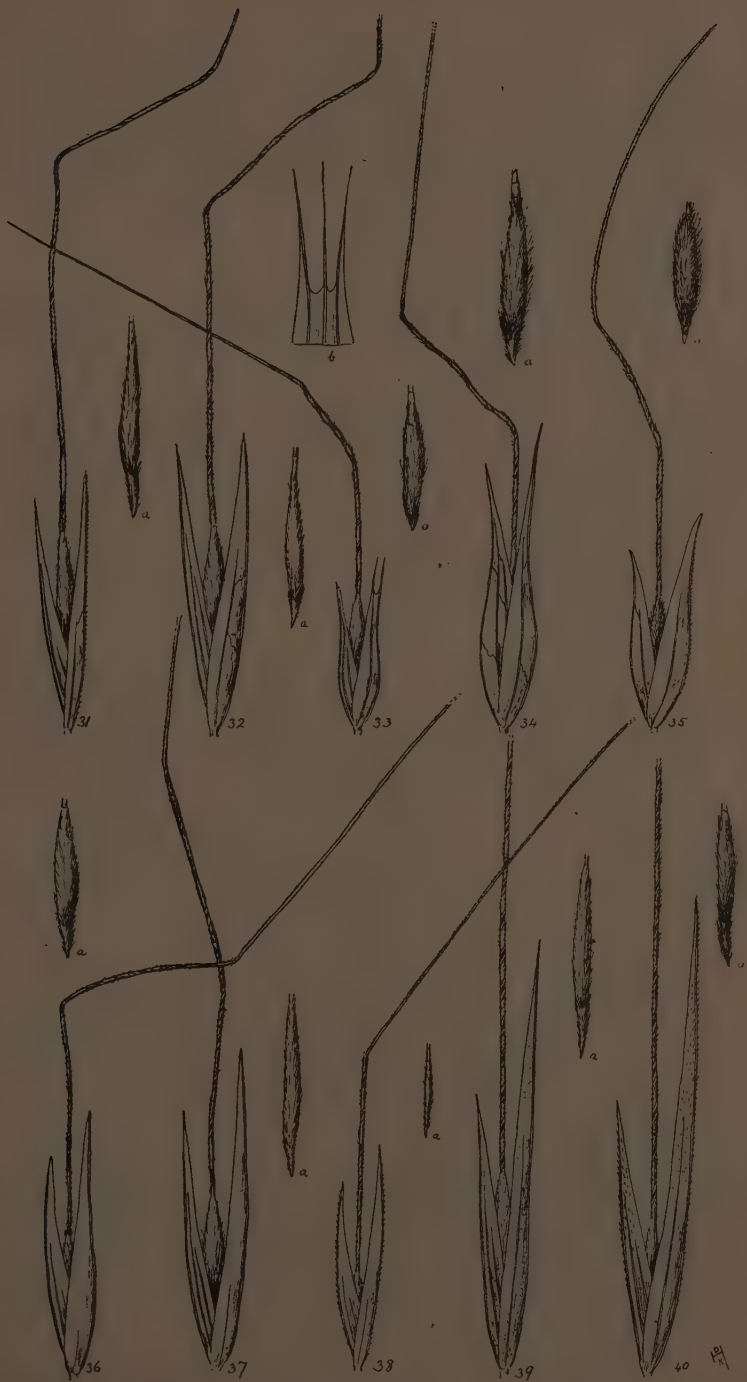
39. **S. compressa,** *R. Br.* Prod. 174. (Figs. 39 & 39A, pp. 27 & 29.)

W. Australia. Swan River, *Drummond*, and no. 134; Claremont, near Perth, in sand, *Cecil Andrews*, 1st coll. 1204; King George's Sound, *Menzies**, *Capt. King*; and without precise locality, *Collie*.

40. **S. lachnocolea,** *Hughes*, nov. sp. (Figs. 40 & 40A, pp. 27 & 29.) *Annua*, sed aliquando basi fasciculis foliorum omnium laminigerorum densis adjectis, 20–30 cm. alta. *Culmi* erecti, molliusculi, plerumque robusti, 1-nodi, nodis glabris non exsertis. *Foliorum* vaginae fasciculorum brevissimae, ad 1·5 cm. longae, pallidae, glabrae vel glabrescentes, culmorum inferiores herbaceae, ad 10 cm. longae, tomentosae pilis lucidis hyalinis, superiores striatae, glabrae, scaberulae, paniculae basin amplectantes; ligulae elongatae ad 1 cm. longae, glabrae; laminae fasciculorum setaceo-convolutae, usque 3 cm. longae, glabrae, foliorum culmorum laxe convolutae, in acumen attenuatae, 5–11 cm. longae, leviter scabriusculae. *Panicula* densa, contracta, ad 20 cm. longa, 1–2·5 cm. lata; axis primarius scaber vel scaberulus; rami fasciculati, scaberuli, ad 8 cm. longi; pedicelli 2–8 mm. longi. *Spiculae* nitidae, subhiantes, luteae. *Glumae* valde inaequales, membranaceae, acuminatae, ad apicem scaberulae; inferior 3-nervis, 2·2 cm. longa; superior 5-nervis, 1·4 cm. longa. *Valva* cylindrica, cum callo 7 mm. longa, breviter pubescens pilis luteis, subintegra; arista ad 12 cm. longa, columna valde torta usque 4·5 cm. longa praeter margines spirarum scaberulos laevi, seta subrecta tenuiter scaberula; valvula valvam aequans, dorso pubescens. *S. compressa*, var. *lachnocolea*, Benth. Fl. Austral. vii. 567.

W. Australia. Swan River, *Drummond* 132*; Kauring on the York-Greenhills Line, *Stoward* 466 p.p.

Victoria. Melbourne, common, *Adamson* 191.



Spikelets of species 31—40, × 3: *a*, valve, × 2; *b*, tip of lower glume, × 6.

Species Dubiae vel excludendae.

S. acrociliata, *Reader* in Vict. Nat. xiii. 167. *S. Readeri*, F. Muell. nomen.

Victoria. Sandy desert, Lowanshire, 1895, *Reader*.

Placed by the author near *S. compressa*, *S. Drummondii*, *S. pycnostachya* and *S. setacea*.

S. campylachne, *Nees* in Lehm. Pl. Preiss, ii. 99.

See note under *S. semibarbata*, R. Br.

S. eremophila, *Reader* in Vict. Nat. xvii. 154.

To judge from the description this species must be closely allied to *S. oligostachya* and *S. leptophylla*, both having lobed valves and ciliate ligules.

It seems to differ from *S. oligostachya* in having longer glumes (1·4–1·8 cm. long), a shorter valve (0·7 cm. long), and a longer awn (8–10 cm. long), and from *S. leptophylla* in the reddish-brown indumentum of the valve and in the longer, stouter and twice geniculate awn.

S. laeviculmis, *Nees* in Lehm. Pl. Preiss, ii. 99.

Van Diemen's Land?

S. longearistata, *Steud.* Syn. Pl. Gram. 127.

"Urville legit ad Port George, N. Holl."

S. Luehmanii, *Reader* in Vict. Nat. xvi. 158.

Victoria. Sandy Desert, Lowan, 1898, *Reader*.

Placed by the author near *S. semibarbata* and *S. hemipogon*, from both of which it differs in having much smaller (7–8 mm. long) glumes, these truncate and toothed.

S. micrantha, *Cav.* Ic. v. 42, t. 467 (1799) non *R. Br.* q.v.

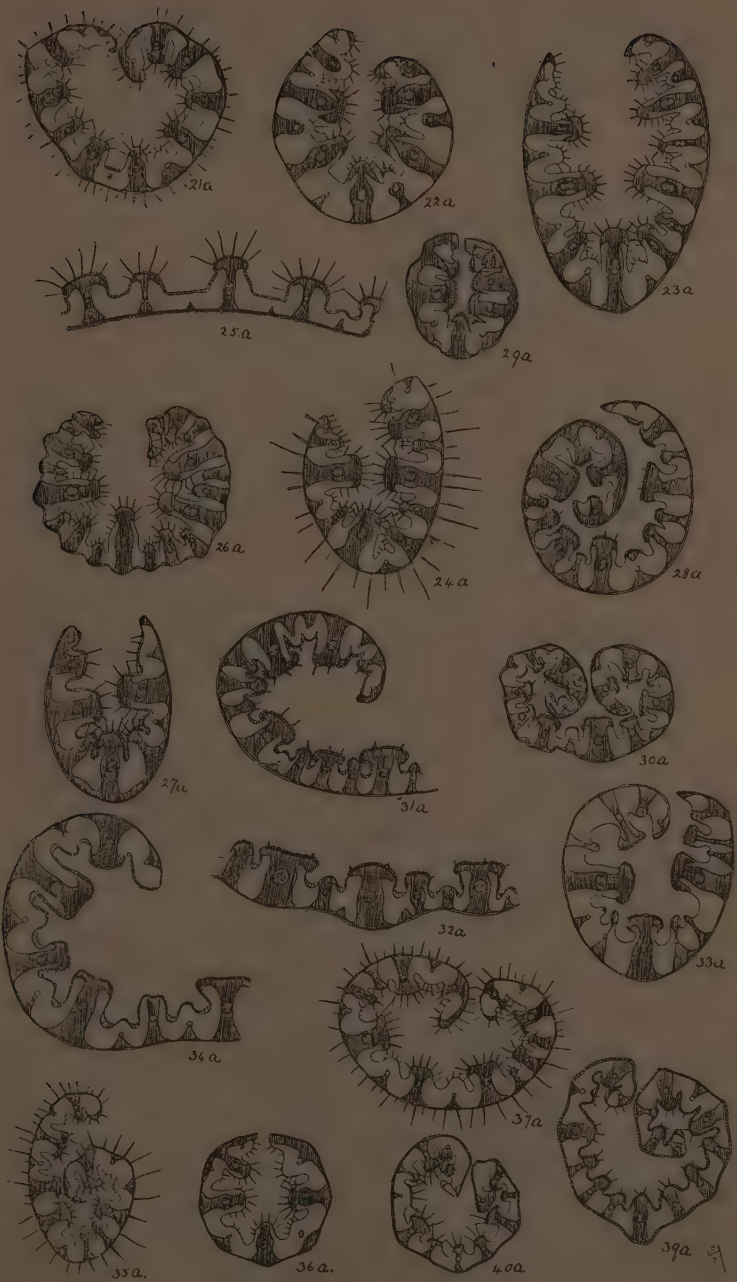
This species is probably identical with *S. ramossissima*, Trin. in Mem. Acad. Petersb., Ser. vi. (1831), i. 74, which has as its type *Sieber Agrostoth.* 82, with the valve very scabrid but not hairy and the awn about 1·6 cm. long. It is not a true *Stipa* but a *Dichelachne*, having 2 not 3 lodicules.

S. micrantha, *R. Br.* Prod. 175 (1810) non *Cav.*

The type specimen (Brown 6201) differs from *S. micrantha*, Cav., in having the valve distinctly hairy all over and the awn about 4 cm. long. This plant agrees entirely with *Sieber Agrostoth.* 64, described by Nees in Spreng. Syst. Cur. Post, 30, under the name of *S. verticillata*. This also is a *Dichelachne*.

S. pubinodis, *Trin. and Rupr.* Gram. Stip. 50.

To judge from the description, this species must be closely allied to *S. pubescens*, R. Br. There are two specimens from Van Diemen's Land written up "S. pubinodis, Trin." by Munro. One is *Gunn* 588 and is identical with *S. pubescens*, R. Br., the other collected by *Llotsky*, is the stout form alluded to under *S. pubescens* and does not agree with the description of *S. pubinodis*, Trin. and Rupr.



Leaf sections of species 21—40, × 30.

S. setacea, var.? **latifolia,** *Benth.* Fl. Austral. vii. 568. *S. scelerata,* Behr. Herb. ex Benth. l.c.

S. Australia. Augusta, *Behr*; Crystal Brook, *F. Mueller;* Murray River, *Blandowski.*

I have not seen any of the specimens quoted by Bentham, and from his brief description of this variety I am not able to judge their identity.

S. striata, *Link* Hort. Berol. 98.

Australia ?

II.—MISCELLANEOUS NOTES.

We note with pleasure in the recently issued list of New Year Honours that His Majesty has been graciously pleased to appoint Dr. E. J. Butler, Director of the Imperial Bureau of Mycology, to be a Companion of the Most Eminent Order of the Indian Empire, and Dr. I. B. Pole Evans, Chief, Division of Botany, Department of Agriculture of the Union of South Africa, to be a Companion of the Most Distinguished Order of St. Michael and St. George.

Mr. E. W. Davy, Agriculturist in the Agricultural Department of Nyasaland (K.B., 1905, 61), has been promoted by the Secretary of State for the Colonies, on the recommendation of Kew, to be Assistant Director of the Department.

Mr. A. E. Walters, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, a Field Assistant, attached to the Laboratories of the Chemical Research Department, Kenya Colony.

Miss E. M. Wakefield.—At the request of the Secretary of State for the Colonies, Miss Wakefield has been seconded for temporary service in the Imperial Department of Agriculture for the West Indies, to act as Mycologist to the Department. Miss Wakefield left Kew to take up her duties in Barbados in August, 1920. On the completion of her work in the West Indies, she will visit some of the pathological institutions in the United States of America, having been elected to a Travelling Scholarship by the Mary Ewart Trustees, before returning to Kew to resume her duties. During the first two months of Miss Wakefield's absence, Mr. Small, Mycologist in the Department of Agriculture, Uganda, has spent a considerable portion of his leave in carrying on the mycological work in the Herbarium, having been deputed to perform this service by the Secretary of State for the Colonies.

Captain A. W. Hill.—The Assistant Director has, with the concurrence of the Ministry of Agriculture and Fisheries, been deputed by the Secretary of State for the Colonies to visit and report on the Botanic Gardens, Victoria, Cameroons, and also to visit Nigeria. He sailed on January 19th, and is expected to be absent some three months.

William Harris.—We record with deep regret the death of Mr. W. Harris, F.L.S., which occurred in Kansas City, U.S.A., on October 11th, 1920. Mr. Harris entered the Royal Botanic Gardens, Kew, in June, 1879, and was appointed Superintendent of the King's House Garden, Jamaica, on August 29th, 1881. Mr. W. Fawcett, who was for many years Director of Public Gardens and Plantations, Jamaica, has kindly furnished us with the following account of Mr. Harris's work in Jamaica.

"When I succeeded Sir Daniel Morris as Director in 1887, Harris was in charge of Castleton Garden, the chief Botanic Garden. On my first visit to this garden, I was struck with its excellent condition and the order and neatness that prevailed. This was the dominant feature in all Harris's work. Besides the King's House and Castleton Gardens, there are others in charge of the Department—all of which were for a time under Harris's superintendence—the Hill Garden, situated at an elevation of 5,000 ft., adjacent to the Government Cinchona Plantations, the Parade Garden or Victoria Park, situated in Kingston, and the old Botanic Garden at Bath, 44 miles from Kingston, which is still kept up for the sake of the magnificent old trees, palms, and other plants, some of them planted by Dr. Clarke in 1779 and subsequent years, others by Dr. Dancer in 1788 to 1798, and others by the Kew gardener, Nathaniel Wilson, from 1846 to 1860. Besides these gardens the Government kept up a trial plantation of numerous varieties of sugar cane on an old sugar estate called Hope, about 5 miles from Kingston. Harris was moved from Castleton to Hope in 1887 to commence the formation of a new botanic garden. In 10 years it had developed into a large garden with 6 acres of lawns, 3½ acres of ornamental borders, also ferneries and glasshouses for delicate plants; collections of orchids, roses, crotons and palms; plantations covering 7½ acres of the chief economic plants as well as 6 or 7 acres of teak. Harris was for the first four years engaged in the laying out of this garden. Then followed nine years of work in the Hill Garden. It was then that it was possible to send him out on collecting tours in search of specimens for the Herbarium. He had shown a capacity for such work, and it was a great pleasure to be able to satisfy his enthusiasm and at the same time to benefit the Herbarium. He became an excellent field botanist with great and accurate knowledge of the local flora. He described one of his tours in a communication to the 'Gardeners' Chronicle' (3rd ser. xix. 1896, pp. 134, 197,

263). Some two years ago he had bought a house in a central situation, hoping in a few years to retire and give up his whole time to exploration and collecting. His good work in connection with the flora has been honoured by the number of plants which bear his name, and also by the two new genera *Harrisia* in *Cactaceae* and *Harrisella* in *Orchidaceae*. His death is an irreparable loss to botanical exploration in Jamaica. He did all his work very methodically and thoroughly, and was always a most helpful and loyal assistant to me. Personally, I mourn the loss of a good and well-tried friend. In 1908, on my retirement and the formation of a Department of Agriculture, which included the Department of Gardens, Harris was made Superintendent of Public Gardens with charge of all the Gardens. In 1917 his good work was recognised by the Government by giving him the title of Government Botanist, and in 1920 he was promoted to be Assistant Director. He was elected a Fellow of the Linnean Society in 1899."

David Ernest Hutchins.—The news has just reached us from New Zealand of the death of a distinguished forester, Sir David Ernest Hutchins. In his long period of public service he has become well known in many parts of the Empire, no less for his alert figure and genial hearty manner than for the skill and never-failing energy with which he has handled the various forestry problems with which he has been called upon to deal.

Born in 1850 he began his forestry training when 20 years old at the Ecole Nationale des Eaux et Forêts, Nancy, in company with such afterwards famous foresters as Mr. E. P. Dansey, Mr. Harry C. Hill and Mr. W. R. Fisher. He was then appointed Deputy Conservator in Mysore, and at once showed his wide views of forestry in two papers which he wrote on Australian trees in the Nilgiris and on the coastal planting of *Casuarina*. These papers are still standard works on their subjects. In 1882 he was transferred to Cape Colony, where, after some years passed in charge of the Knysna forests, he succeeded Count Vasselot de Regné as Chief Conservator and remained until 1905. The numerous large plantations of Australian Eucalypts in all parts of South Africa will be a never-dying memorial there to his enterprise. After leaving the Cape he was called upon to organise the Forestry Department in British East Africa, and while there succeeded in demarcating reserves and, among other things in establishing economic plantations of the Chinese Coffin-wood tree (*Persea nanmu*).

When he retired and came home, his extraordinary talent for organising forestry work was not long left idle.

In 1907 he was employed by the Colonial Office to report on the value of the Kenia forests (Col. Rep. Misc. 41, 1907), and in 1909 to inspect the forests of Cyprus (Rep. on Cyprus Forestry, 1909). In 1914 he had a long-looked-for opportunity of visiting

Australia and of seeing in their native habitats the trees he had so often planted. In 1916 the Western Australian Government published his work on Australian Forestry. He next visited New Zealand for the purpose of advising the Government on the preservation of the valuable Kauri trees (Waipoua Kauri Forest, its demarcation and management, 1918). In 1920, in recognition of the above services, the honour of knighthood was conferred upon him, thus fittingly closing his long and distinguished career.

Henry F. C. Sander.—The death of Mr. H. F. C. Sander, F.L.S., which occurred at Bruges on December 23rd, 1920, in his 74th year, deprives commercial horticulture of one of its most active leaders. For many years Messrs. Sander and Sons, Nurserymen, St. Albans and Bruges were the principal importers of orchids and other tropical and subtropical plants, to the great advancement of indoor gardening. He was a liberal contributor to Kew, the orchid collection being largely indebted to him for many new and rare species, as also are the collections of stove plants, including palms, ferns, cycads, &c. He also presented many dried specimens obtained by his collectors in tropical countries. The largest example of *Grammatophyllum speciosum* (*Bot. Mag. t.* 5157) ever seen in Europe, which has for many years been a striking object in the Victoria House, where it has flowered several times, was presented to Kew by Mr. Sander in 1893, having been obtained at considerable expense from the forests of Penang. Mr. Sander did much to foster a love for orchid cultivation in this country by his enterprise in collecting and importing the most attractive species in quantity. He was also one of the first to realise that home-raised orchids, particularly hybrids, were worthy of attention, and many of the most popular hybrids were bred in his nurseries. He grew for exportation enormous numbers of palms, azaleas, camellias, bays, tuberous begonias, &c., employing hundreds of men in his two nurseries, which comprised over 4 acres of glasshouses in St. Albans and over 100 in Bruges, many of them of great dimensions. At one time there were 30 houses devoted entirely to orchids in the Bruges Nursery. Mr. Sander combined with great business capacity a keen love of plants of all kinds, and an extraordinary skill in arriving at the best cultural treatment for new and untried plants. His exhibits of orchids and other plants at the great shows held in London, Paris, St. Petersburg, Vienna and other centres were much appreciated by connoisseurs. Botany as well as horticulture owes much to his zeal and enterprise. W. W.

Earlier Hours of Opening.—The Minister of Agriculture and Fisheries has had under consideration the question of the hours of opening to the public of the Royal Botanic Gardens, Kew.

Hitherto admission to the Gardens on week days has been from 10 a.m. during the summer months and from noon during the winter months. Admission on Sundays has been from 1 p.m. throughout the year. Lord Lee of Fareham has now issued instructions that the public be admitted every day, except Christmas Day, throughout the year from 10 a.m., with effect from 1st January, 1921.

The number of visitors to the Gardens during 1920 was 1,131,771.

Additions to Gardens, 1920.—The number of separate consignments of living plants, seeds, &c., to the Gardens was 390. The most important were the following :—

Glasnevin Botanic Gardens.—Various trees, shrubs and seeds; *Briggsia amabilis*, *Lilium Bakerianum*, and 8 species of Cistus.

Edinburgh Botanic Garden.—Various plants and seeds; *Ouvirandra fenestralis.*

Cambridge Botanic Garden.—Various stove and greenhouse plants.

R.H.S. Gardens, Wisley.—30 species of herbaceous plants; 17 packets of seeds collected by Forrest.

John Innes Horticultural Institution, Merton.—Various plants and seeds.

Wellcome Chemical Research Laboratory.—*Urginea Burkei.*

Dominica Botanic Garden.—Seeds of *Attalea Cohune*, *Syagrus* sp. and *Raphia vinifera.*

Arnold Arboretum.—Many hardy trees and shrubs, including *Taiwania cryptomerioides;* many packets of seeds, including *Lilium cernuum.*

Darjeeling, Lloyd Botanic Garden.—432 packets of seeds collected in the mountains, including *Castanopsis hystrix* and *Aesculus pundeana.*

Sydney Botanic Garden.—Seeds of Eucalypti, &c.

Pretoria Department of Agriculture.—Stapelias, bulbs and seeds of 38 species of *Aloe; Brachystelma* sp.

Nairobi Forestry Department.—*Euphorbia* sp., *Cyrtanthus* sp., *Amomum* sp., *Crinum* sp., and 4 species of *Asparagus; Buddleia salviaefolia.*

Pekin Forestry Department.—Seeds, 12 species trees and shrubs.

La Mortola (the late Lady Hanbury).—156 packets of seeds.

Mauritius Botanic Garden.—Seeds of 14 species of palms.

Queenstown Public Gardens, S. Africa.—Stems of *Encephalartos Frederici-Guilielmi*, tuber of *Amorphophallus*, and *Kniphofia* sp.

National Botanic Garden, Kirstenbosch, Cape Town.—Three species of *Aloe.*

Uganda Botanic Garden.—32 packets of seeds, tubers of Orchids.

Grenada Botanic Garden.—32 plants of *Danaea.*

Egyptian Ministry of Agriculture, Hort. Sect., Giza.—Various seeds, including *Nelumbium speciosum*.

Florence Institute of Forestry.—Various seeds, plants and cuttings.

Macgregor Museum, Kimberley.—*Caralluma lutea*.

Khartoum Palace Gardens.—*Aloe* sp., *Euphorbia venenifera*.

Major L. de Rothschild, St. Swithin's Lane.—Many packets of seeds collected by Farrer.

Mr. C. Eley, East Bergholt.—Seeds collected by Forrest.

Mr. A. K. Bulley, Neston.—Seeds collected by F. K. Ward.

Mr. J. C. Williams, Caerhays.—Seeds collected by Forrest.

Mr. R. Farrer (the late).—Seeds of 20 species of Rhododendron.

Messrs. Charlesworth & Co., Haywards Heath.—Orchids.

Mr. R. H. Beamish, Ashbourne.—Seeds of *Corylus tibetica;* various herbaceous plants.

Duke of Bedford, Woburn.—*Larix pendula*.

Sir E. G. Loder (the late), Leonardslee.—Seeds of *Glyptostrobus heterophyllus*.

Mr. H. Blanchard, Parkstone.—Seeds of *Telopea oreades*.

Messrs. Boustead & Co., Leadenhall St.—Seeds from Brazil.

Mr. G. W. E. Loder, Wakehurst Place.—Seeds *Rhodoleia Championae; Ranunculus insignis;* various shrubs; *Ficus Krishnae*, etc.

Mr. W. R. Price, Chepstow.—13 kinds of *Meconopsis* and 7 of *Primula* from Forrest's seeds.

Mr. Bethune, Strathpeffer.—*Senecios Smithii*.

Mr. A. L. Allen, St. James' St.—Seeds and plants of 12 species of *Mesembryanthemum* and *Aloe*.

Mr. H. A. Moore, Saintfield.—Chinese Rhododendrons.

Donard Nursery Co., Co. Down.—Various trees and shrubs.

Mr. H. J. Elwes, Colesborne.—*Arisaema utile*, large plant of *Puya chilensis*.

Mrs. Lechmere, Hampton.—51 packets of seeds from Kashmir.

Dr. Bedford, York.—Various Orchids.

Mr. N. E. Brown, Kew.—Stapelias and Mesembryanthemums.

Messrs. Sander and Sons, St. Albans.—Large plant of *Vanda luzonica;* seeds of *Leucadendron argenteum;* various stove plants.

Prof. A. Henry, Dublin.—Seeds of *Pseudotsuga Douglasii* var. *caesia*.

Maj. F. C. Stern, Goring-by-Sea.—*Lonicera Hemsleyana*, *Papaver* sp., *Lilium Brownii*? etc.

Hon. Vicary Gibbs, Elstree.—Herbaceous plants.

Mr. J. S. Gamble, East Liss.—*Pinus Bungeana*.

Mr. S. Mallock, Exeter.—*Asplenium Hemionitis*.

Sir H. A. Wickham, Royal Colonial Inst.—Three packets of seeds; plants of *Bilbergia*, *Agave* and *Furcraea*.

The O'Mahoney, Wicklow.—Seeds of "Scarlet Furze" from Patagonia.

Sir Arthur Brown, Farnham.—*Hoya burmanica*.

Prof. W. G. Craib, Aberdeen.—Gooseberry × Blackcurrant.

Miss M. A. Rogers, Bournemouth.—Large plant *Aloe Bainesii.*

Mr. T. Wylde, Putney.—Tuber of *Amorphophallus* from Rhodesia.

Mr. W. J. C. Frost, Fulham.—*Cypripedium Mastersianum.*

Mr. A. E. Bowles, Waltham Cross.—Herbaceous plants.

Messrs. Lee & Co., Lime St.—Bromeliads and Orchids from Colombia.

Mr. A. M. Mitford, Upton Park.—*Macrozamia, Anona. Diospyros;* various seeds.

Mr. R. Cory, Cardiff.—Hybrid Cordylines.

Mr. R. B. Rogers, Launceston.—*Larix Potanini, Juglans regia racemosa,* white fragrant *Cyclamen.*

Mr. A. Grove, Henley-on-Thames.—Seeds of *Paeonia Delavayi* and *Lilium mirabile.*

Mr. R. N. Parker, Chamba, Punjab.—Seeds of *Abies Webbiana* var., *Jasminum Parkeri, Alnus nepalensis,* etc.

Miss Mason, Cape Town.—Various native bulbs and seeds.

Prof. Trelease, St. Louis.—Seeds of *Agave cupreata.*

Messrs. Vilmorin-Andrieux & Co., Paris.—Various plants and seeds.

Mr. G. Fraser, Ucluclet, Canada.—Hybrid *Lonicera, Rhodora* and *Azalea.*

Mr. M. T. Dawe, Bogota.—Various Orchids and Seeds.

Mr. R. Fyffe, Entebbe, Uganda.—Various seeds; tubers of *Lissochilus* and an Irid.

Mr. N. H. Cowdry, Pekin.—26 packets of Chinese seeds.

Mr. W. B. Alexander, Swan River, Australia.—Seeds of *Macrozamia Frazeri, Melaleuca, Boronia* and *Eucalyptus.*

Mr. C. H. Lankester, Costa Rica.—Various Orchids, Bromeliads, etc.; *Peristeria elata.*

Mrs. Addison, Sierra Leone.—*Heamanthus multiflorus.*

Dr. C. Skottsberg, Gothenburg, Sweden.—20 packets of seeds from Juan Fernandez.

Mr. C. R. Orcutt, California.—*Echinocereus Orcuttii* and *Hassianthus Orcuttii.*

Mr. J. A. Peterson, Cincinnati.—Begonias.

Mr. C. Maniques, Santiago.—Seeds of *Lomatia obliqua* and *Nothofagus Dombeyi.*

Rev. J. Roscoe, Uganda.—*Crinum* sp., various seeds.

Mr. E. C. Villiers, Ceylon.—*Anoectochilus regalis, Cannas,* various bulbs.

Mr. J. Burtt-Davy, Pretoria.—Seeds of *Jubaeopsis caffra.*

Mr. H. Johnson, Guatemala.—Seeds of *Epiphyllum pumilum.*

Mr. D. Tannock, Dunedin.—Seeds of Celmisias, etc.

Mr. T. F. Bourdillon, S. India.—Seeds of *Strychnos cinnamomifolia.*

Mr. J. Wilson, Buenos Aires.—Seeds of *Quebrachia Lorentzii.*

Madame Perez, Teneriffe.—A quantity of seeds of *Juniperus Cedrus.*

Lt.-Col. Lee, Burma.—*Lilium sulphureum.*

Dr. R. Marloth, Sutherland, S. Africa.—Two species of *Duvallia*.

Mr. P. Chandler, Uganda.—32 packets of seeds.

Mr. J. S. Dash, Station Agronomique, Guadaloupe.—Seeds of *Sesbania sericea*.

Surplus plants from the collections were distributed as usual, either in exchange with botanic gardens, nurserymen, etc., or as gifts to various teaching institutions, and there was the usual distribution of seeds produced by the cultivated plants. The total number of packets thus distributed was 1,696 of hardy trees and shrubs and 2,217 of hardy herbaceous plants. The most important of the seeds obtained for special distribution were: *Abies brevifolia* var. *Webbiana*, *Dipterix odorata*, *Stenocarpus sinuatus*, *Lomatia obliqua*, *Sesbania sericea*, *Magnolia Wilsoni*, *Quebrachia Lorentzii*, *Aesculus indica*.

The recipients of plants, etc., from Kew included the following:—

Duke of Bedford, Woburn.—Trees and shrubs.

Lord Harcourt, Nuneham.—Trees and shrubs.

Hon. Vicary Gibbs, Elstree.—Herbaceous plants.

Rev. R. W. C. Hurst, Wheatley.—Collection of species of *Rosa*.

Miss Willmott, Warley.—Trees and shrubs.

Major Hurst, Burbage.—100 species of *Rosa*.

Major L. de Rothschild, Exbury.—Rhododendrons and other shrubs.

Col. D. V. Pirie, Eaton Square.—Trees and shrubs.

Mr. H. J. Elwes, Colesborne.—Succulent plants, etc.

Trinidad Botanic Gardens.—Collection of succulents.

H.E. The Governor, Falkland Islands.—Cuttings of Poplars and Willows; seeds of trees.

Glasnevin Botanic Gardens.—Trees, shrubs and indoor plants.

Cambridge Botanic Garden.—Collection of plants.

Cyprus, Department of Agriculture.—Seeds of sub-tropical plants.

Jardin des Plantes, Paris.—Many trees and shrubs.

Richmond Park.—Many trees and shrubs.

National Physical Laboratory, Teddington.—300 trees and shrubs.

Hampton Court Gardens.—1,500 trees and shrubs.

Imperial War Graves Commission, France.—5,000 cuttings of trees and shrubs.

Heston Hospital.—Trees and shrubs.

Blackheath High School.—Trees and shrubs.

Chiswick County School.—Trees and shrubs.

Putney County School.—Trees and shrubs.

Bedale's School, West Drayton.—Trees and shrubs.

Tudor House, Newington.—Trees and shrubs.

Internal painting and repairs in the South Wing of the Palm House and the Mexican Wing of the Temperate House neces-

sitated the closing of these two structures to the public for a portion of the year. The beds in the Temperate House have been largely replanted and the *Musa* collection in the Palm House has been restarted in a specially prepared border. The beds in No. 1 House have been renovated. The Succulent House (No. 5) has been thoroughly overhauled and some of the largest specimens retubbed. The festoon of ivy surrounding the Range Terrace having become worn out, it has been replaced by a collection of Wichuraiana Roses supported on iron pillars and chains. Owing to the heavy fogs experienced in November-December, a sticky layer of soot, etc., was deposited on the glass roofs, which had to be washed with mops. The effects of the fog on the collections under glass were worse than anything experienced for many years. The leaves of many plants, particularly Begonias, fell off, and the flowers and buds of the majority of plants which bloom in winter were spoilt.

Arboretum.—The large and continuous influx of new Rhododendrons, chiefly from China, has rendered the provision of more space for them necessary. Another of the slopes of the mound on which King William's Temple stands has been cleared of a miscellaneous plantation of shrubs and planted with various representatives of this genus, a few of the larger trees being left to provide the shade many species of *Rhododendron* delight in. Thanks to the generosity of various friends of Kew, especially Mr. J. C. Williams and Mr. Lionel de Rothschild, M.P., a great number of seedlings of new species are now in the nursery, raised from seed collected by Mr. Forrest and the late Mr. Reginald Farrer. How far they will be adapted to the climatic and other conditions of Kew has yet, of course, to be proved.

The removal of a deodar which stood at one corner of the Water-lily Pond has provided an opportunity of enlarging the area and improving the outline of this popular feature of Kew. Mr. L. de Rothschild has kindly promised to provide Kew with a selection of the best varieties from his fine collection of hardy Nymphaeas at Gunnersbury.

About half the potato plot in front of Kew Palace was sown with grass seed and made into lawn again, the remainder being cropped with Up-to-date potatoes. Considering that this was the third potato crop taken from this piece of ground in successive years without manure, the yield was very good, although somewhat reduced by disease.

Although there was a good crop of grass, the weather during June and July was so unsettled that the harvesting proved very troublesome, and much of the hay was of very inferior quality.

The removal of a few superfluous common trees near the collection of beeches has enabled us to give more space to young trees recently acquired. In 1902, when the last edition of the "Hand-list of Trees and Shrubs" was published, the collection

of *Fagus* at Kew consisted only of *F. sylvatica*, *F. ferruginea* and their varieties. Since then this genus has been considerably augmented and the following species are now growing in the open air at Kew :—

F. Engleriana, Seemen.
F. japonica, Maxim.
F. orientalis, Lipsky.
F. sylvatica, Linn.
F. ferruginea, Aiton.
F. longipetiolata, Seemen.
F. Sieboldii, Endl.

Of the Southern beeches, now generally regarded as generically distinct under *Nothofagus*, the following are growing in the open air at Kew :—

N. antarctica, Oerst.
N. betuloides, Blume.
N. procera, Oerst.
N. Dombeyi, Blume.
N. obliqua, Blume.

Fagus lucida, Rehd. et Wilson, of which some living plants were brought to the Arnold Arboretum by Mr. E. H. Wilson from Western Hupeh in 1911, Kew does not yet possess.

In February about 1,500 trees and shrubs were supplied to the Hampton Court Gardens, and in December about 300 for planting in the grounds of the National Physical Laboratory at Bushey Park.

Museums.—It is gratifying to record that the Museums are increasingly used not alone by students, but by commercial firms and others engaged in the development of the vegetable resources of the Empire. The demands of correspondents are extremely varied and often of a complex nature, quite in keeping with the miscellaneous products submitted for determination, report, and for references to literature, etc. In critical examination of many of the more difficult subjects, the Assistant Keeper of the Jodrell Laboratory has given most valuable aid. Much has been done to improve the collections. The donations have been more numerous than of recent years and many most valuable additions to the Museums were generously presented by exhibitors at the Empire Timber Exhibition held at Holland Park during the summer. In this connection it should be recorded that a selection of home-grown timbers from Museum No. IV. was included in the exhibition, and the services of Mr. W. Dallimore, an Assistant in the Museums, who represented the Royal Botanic Gardens on the Committee for the Home-grown timber exhibit, were greatly appreciated by the authorities. A selection of duplicate material was also sent to the Bath and West and Southern Counties Show, and later transferred to the Royal Counties Show. A collection of water-colour drawings representative of the vegetation of Southern and Eastern Africa made there by Miss M. H. Mason and presented by her to the Royal Botanic Gardens has been framed and placed on exhibition on the upper floor of Museum IV.

J. M. H.

Presentations to Museums.—The following miscellaneous specimens have been received in addition to those previously recorded in the *Bulletin* :—

The Explosives Trades, Ltd., Cavendish Square, London.—Case containing specimens illustrating the extraction of tree stumps by explosives.

Messrs. Gabriel Wade and English, Ltd., Commercial Road, Lambeth.—Samples of Elm treated with a patent process and marketed as Greywood.

The Chief, Division of Botany, Pretoria. Gum from *Combretum erythrophyllum*.

Mr. H. J. Elwes, F.R.S., Colesborne, Gloucester.—Garment woven from the bark of a species of *Ulmus* by Ainos of Hokkaido, also a rope of the same material used for carrying burdens.

Dr. T. A. Henry, The Wellcome Chemical Research Laboratory, London.—Sample of oil of *Jessenia polycarpa*, Colombia.

Messrs. John Eede Butt and Sons, Littlehampton. Plank of Service Tree (*Pyrus Sorbus*).

Messrs. Box and Turner, Ardingly.—Various articles made of Oak and Ash.

Messrs. J. and P. Coats, Ltd., Glasgow.—Exhibition case containing a set of Birch spools.

Messrs. B. Horton and Son, Westerham, Kent.—Oak laths and palings.

Messrs. J. Stenning and Son, Ltd., East Grinstead.—Window sills of Oak, Wrest planks of Beech, etc.

Messrs. John Sadd and Sons, Ltd., Malden, Essex.—Panel and mantel-piece of Brown Oak, wheel hubs of Oak and Elm and various other articles.

Messrs. Robert Batcheller and Sons, Ltd., Maidstone.—Railway keys and trenails.

The Wood Wool and Fibre Co., Ltd., Hackney Wick, London, E.—Samples of Wood Wool prepared from Poplar.

Messrs. Thomas James, Ltd., Bermondsey.—Spokes made of Oak.

Messrs. William Stenning and Son, Red Hill.—Plane Blocks of Beech.

Mr. H. Rossiter, Bittern Street, Boro.—Samples of Hut Blocks of various woods.

Messrs. R. Groom, Sons & Co., Wellington, Salop.—A large assortment of turned and other articles of woodware, chiefly for household and dairywork.

Mr. Patrick Green, Ingatestone, Essex.—Tinplate boxes made of Elm.

Messrs. E. W. Turner and Son, Ltd., Bloxwich.—Set of Oak wagon scantlings.

Messrs. Oates, Ltd., Worksop.—Tool handles made of Ash and of Sweet Chestnut.

Messrs. Wilson Bros., Bobbin Co., Ltd., Garston, Liverpool.—Large case, containing bobbins of various home-grown woods in different stages of manufacture.

Mr. Milne-Home, Canonbie.—Sections of a young tree of Japanese Larch.

The Rt. Hon. F. D. Acland, Forestry Commission, Grosvenor Gardens, London.—Plank of Scots Pine from a tree grown in Devonshire.

Mr. H. C. Eyles, Office of Woods, Regent's Park.—Two planks and a transverse section of *Cedrus Deodara* from the Forest of Dean.

Mr. John Roberts, Tintern.—Various articles turned from Coppice wood.

Mr. J. Burtt-Davy, Kew.—A miscellaneous collection of articles from South Africa.

The Crown Agents for the Colonies.—A selection of planks of Colonial Timbers from the Empire Timber Exhibition, Holland Park.

Mr. C. A. Benn, Kington, Hereford.—Plank from a tree of *Abies nobilis*, which attained a height of 83 ft.

Mr. M. T. Dawe, St. James' Square, London.—Sample of wood of Comino crespo (*Aniba perutilis*), series of specimens and photographs to illustrate the manufacture of Panama hats, also samples of Balata, Gum Chicle, and various other Colombian products.

Superintendent, Small Arms Factory, Enfield Lock.—Examples of gun stocks as exhibited at the Empire Timber Exhibition.

Sir D. Morris, K.C.M.G.—Cones of *Pinus Morinda* from West Dorset.

The Incorporated Oil Seed Association, St. Mary Axe.—Samples of Chinese Galls (*Rhus semialata*) and six samples of oil seeds.

Mr. M. Ruben, Scrutton Street, London.—Panel of finely figured Satinwood.

Capt. Loutit, M.C., Aberdeen.—Three sections of Bog Oak from a peat bog at Ardo, Aberdeenshire. J. M. H.

Research in Jodrell Laboratory in 1920.—Mr. L. A. Boodle made some experiments with bamboo in relation to attack by boring beetles, and continued some observations on the development of the ovule in an *Aroid*.

Dr. C. J. F. Skottsberg examined some points in the structure and development of the thallus in *Splachnidium*.

Dr. J. C. T. Uphof began a study of the comparative anatomy of several species of *Davallia*.

Prof. F. E. Weiss compared the anatomical structure of certain graft-hybrids with that of the parent plants.

Mr. W. C. Worsdell completed a study of the anatomy of the *Polygonaceae*.

Presentations to the Library during 1920.—The Bentham Trustees have presented 16 herbals published between the years 1529 and 1744. These include the first edition (1557) of Adam Lonicer's *Kreuterbuch*, in which several of the figures have been crudely coloured, and the edition of 1578; an excellent copy of Dioscorides, *De Materia Medica libri v.*, 1529–30, with Greek and Latin text in parallel columns, the edition published at Salamanca in 1586 "traduzido . . . en la vulgar Castellana," and the octavo Spanish edition, translated by Juan Jarava, and published at Antwerp in 1557; Mattioli, *Discorsi ne' sei libri di P. Dioscoride della materia medicinale*, Venice, 1744, and the French edition of Mattioli's Commentaries, dated 1566; a good copy of the apparently rare edition of Dodcens' *Cruydt-Boeck*, printed at Leyden in 1618 by F. van Ravelingen; Malpighi's *Opera posthuma*, 1697; Poppe's *Kräuterbuch*, 1625; Brasavola, *Examen omnium simplicium medicamentorum, quorum in officinis usus est*, 1539; La Brosse, *De la nature, vertu, et utilité des plantes*, 1628; Rhagor, *Erneuerter Pflantz-Garten*, 1669; and Durante, *Herbario novo*, 1667.

From the Trustees of the British Museum have been received the fourth volume of Fawcett and Rendle's *Flora of Jamaica; Birds Beneficial to Agriculture*, by F. W. Frohawk; and *Marine Boring Animals Injurious to Submerged Structures*, by W. T. Calman.

The Director-in-Chief of the New York Botanical Garden, Dr. Britton, has completed the Kew set of the *Contributions from the New York Botanical Garden*, and has sent the continuation of the *North American Flora;* he has also presented the second volume of the splendid work by him and Dr. J. N. Rose on the Cactaceae, and a copy of *The Bahama Flora*, by him and Dr. C. F. Millspaugh.

Mr. J. H. Maiden has presented, in addition to several of his pamphlets, parts 39–43 of his monumental work on *Eucalyptus*. Parts 63 and 64 of his *Forest Flora of New South Wales* have been received from the Secretary for Agriculture.

Numerous presentations have been made by Lieut.-Col. Sir David Prain, including:—*Travaux du Laboratoire de Matière Médicale de l'École Supérieure de Pharmacie de Paris*, Tome xi; 36 papers on Papaveraceae, by F. Fedde; *National Antarctic Expedition, 1901–1904: Album of Photographs, &c.*, published by the Royal Society; *Contribution à l'étude anatomique de la famille des Ternstroemiacées*, by L. Beauvisage; *Frost und Licht als beeinflussende Kräfte bei der Samenkeimung* (Supplement 2), by W. Kinzel; and recent issues of the *Berichte der Deutschen Botanischen Gesellschaft* and of the *Bulletin de la Société Botanique de France*.

Capt. A. W. Hill has presented a copy of *The English Rock Garden*, by the late Reginald Farrer; the first part of *The Flowering Plants of South Africa*, edited by I. B. Pole Evans; and several pamphlets.

From Dr. Otto Stapf have been received 15 issues of the *Jahresbericht der Gesellschaft zur Förderung der naturhistorischen Erforschung des Orients in Wien.*

Prof. Hans Schinz has continued to send the *Mitteilungen aus dem Botanischen Museum der Universität Zürich* of which nos. 82, 83, 85–88 have been received. He has also presented the second part of the Botany, edited by himself and Mr. A. Guillaumin, of the work on New Caledonia by F. Sarasin and J. Roux.

Contributions too numerous to specify here have been received from several institutions besides those already mentioned, the more important being:—the Smithsonian Institution, the United States Department of Agriculture, the Gray Herbarium and Arnold Arboretum of Harvard University, the Osborn Botanical Laboratory of Yale University, the Cornell University Agricultural Experiment Station, the Agricultural Research Institute, Pusa, the Ministry of Agriculture, Egypt, the Departments of Agriculture of Buitenzorg, New Zealand, and the Union of South Africa, the College of Science of the Imperial University of Tokyo, the Botanical Library of the University of Copenhagen, the Landbouwhoogeschool, Wageningen, and the Station of Vegetable Pathology, Paris. The Bureau of Forestry, Government of Formosa, has sent the ninth volume of the *Icones Plantarum Formosanarum*, by B. Hayata; and the New Zealand Institute, vols. 48, 49 and 50 of its Transactions, as well as two parts of the Bulletin on Mosses, by H. N. Dixon. The Crown Agents for the Colonies have presented the second edition of the *Handbook of Uganda*, by H. R. Wallis; and from the South African Biological Society have been received two numbers of its Bulletin and two numbers of *The South African Journal of Natural History.*

Mr. Oakes Ames is continuing his *Studies in the Family Orchidaceae*, and just recently has presented a copy of the sixth fascicle; also a separate set of the illustrations in it for the Kew collection of drawings. A further valuable addition to this collection, made by Dr. J. J. Smith, is a set of nearly 200 of his published plates, chiefly of Orchidaceae. Dr. Smith has also presented 12 of his papers.

From the publishers have been received *The Nature-study of Plants*, by T. A. Dymes (S.P.C.K.), and *The Centenary Volume of Charles Griffin and Company, Ltd.*

A small duodecimo, entitled: *Œuvres du Marquis de Villette*, which was published in London in 1786, has been presented by Mr. G. H. Wollaston. The interest attaching to this volume, as far as Kew is concerned, is due to the fact that the paper used for it was made from the bark of the lime-tree, and that, bound in at the end, are 21 leaves made from the wood or bark of other plants, the French names of which are printed on the leaves themselves. Among the plants represented in this way are the mallow (probably *Althaea officinalis*), hop, nettle, willow, oak, poplar, hazel, spindle-tree, dog's-tooth grass, common reed,

elm, burdock, colt's-foot, algae, a moss, and a thistle. The paper from the mallow is distinctly the best.

Dr. L. H. Bailey has presented the first issue of his *Gentes Herbarum;* also *Annals of Horticulture in North America*, 1891, completing the Kew set; and *Blackberries of New England—their classification*, by E. Brainerd and A. K. Peitersen.

From Mr. R. T. Baker, who, in collaboration with Mr. Henry G. Smith, had previously produced two fine quartos, one, *A Research on the Pines of Australia*, and the other, *A Research on the Eucalypts, especially in regard to their essential oils*, has published and presented a copy of a third volume,*The Hardwoods of Australia and their Economics.*

The following have been received from their respective authors or editors:—*Étude . . . de la famille des Turnéracées*, by M. G. Berger; *Dr. S. H. Koorders:* [An account of his life and work], by E. H. B. Brascamp; *Pflanzenphänologische Beobachtungen in Finland*, by V. F. Brotherus, 1912–1913, and other papers; *Révision des Cypéracées de Madagascar*, by H. Chermezon; *A monograph of the genus Dryopteris*, by Carl Christensen, part 2; *Eubasidiomycetes Lusitanici Herbarii Universitatis Olisiponensis*, by A. X. P. Coutinho; *Mission forestière et agricole du Comte Jacques de Briey au Mayumbe (Congo Belge)*, by E. De Wildeman, who has also presented several of his smaller works; *An account of the Herbarium of the University of Oxford*, by G. C. Druce and S. H. Vines, from Dr. Druce; *Insect Pests and Fungus Diseases of Fruit and Hops*, by P. J. Fryer; *Economic Trees and their By-products*, and *The Soil and its care*, by Mrs. M. Grieve; *Forests, Woods and Trees in relation to Hygiene*, by Augustine Henry; *Pastimes for the Nature Lover*, by Stanley C. Johnson; *The Botany of Iceland*, edited by L. Kolderup Rosenvinge and Eug. Warming, vol. ii, part 1; *Revision crítica e iconográfica de las plantas barrilleras de España*, by B. Lázaro e Ibiza; *Pine-apple Disease of Sugar Cane*, by T. Miyake; *Flora sylvatica Koreana*, part 8, and *Report on the Vegetation of the Island Ooryongto or Dagelet Island, Corea*, by T. Nakai; *The Vegetation of Northern Cape Breton Island, Nova Scotia*, by G. E. Nichols; *Practical Plant Biochemistry*, by Mrs. M. Wheldale Onslow; *Las Chlorideas de la República Argentina*, by L. R. Parodi; *Gli Arboreti Sperimentali di Vallombrosa*, by L. Piccioli; *Two preglacial Floras from Castle Eden*, &c., by Mrs. Clement Reid; *Phanerogamic Flora of the Divisions of Uitenhage and Port Elizabeth* (Memoir no. 1 of the Botanical Survey of South Africa), by S. Schonland; the same, and a copy of the Dutch edition, from Dr. I. B. Pole Evans, Director of the Survey; *The Natural History of Juan Fernandez and Easter Island*, edited by Carl Skottsberg, vol. ii (Botany), part 1; *The Travels of Peter Mundy in Europe and Asia*, edited by Lt.-Col. Sir R. C. Temple, Bt., vol. iii; *Index to the Genus Rhododendron*, by E. H. Wilding; *Journal of Archibald Menzies kept during his three visits to the Sandwich or Hawaiian Islands in the years 1792–1794*, edited and annotated by W. F. Wilson.

Among others who have made presentations to the Library the following should be mentioned as the donors of papers by themselves, or, in a few cases, of other publications :—Dr. S. Agharkar, Prof. E. B. Babcock, Dr. P. A. van der Bijl, Prof. S. R. Bose, Mr. H. S. Carey (*The Carices of the Northern United States*, by John Carey, with MS. additions by the author), Dr. E. Chiovenda (5 papers), Prof. R. Chodat (numerous publications from the Institute of Botany, University of Geneva), Mr. J. L. Collins, Mr. M. T. Dawe, Dr. L. Diels (9 papers), Mr. H. N. Dixon (*Lichens du Mexique*, by M. Bouly de Lesdain), Mr. Kinsley D. Doyle (*Contribución al conocimiento de los arboles de la Argentina*, by S. Venturi and M. Lillo), Mr. S. T. Dunn (2 papers, by N. H. Cowdry), Lt.-Col. F. R. Durham (*Excursionsflora für Tölz und Umgebung*, by A. Hammerschmid), Mr. Gunnar Erdtman, Dr. I. B. Pole Evans, Dr. C. E. Fairman, Mr. O. A. Farwell, Mr. J. S. Gamble (76 pamphlets by various authors), Mr. R. W. T. Gunther, Prof. R. A. Harper, Prof. L. Hauman, Mr. A. Howard, Lady Hooker (several publications of the Royal Academy of Belgium), Prof. F. Kränzlin (21 papers); Prof. G. Lagerheim (*Studien über Konstruktions-typen und Entwicklungswege des Embryosackes der Angiospermen*, by B. Palm), Mr. C. G. Lloyd, Capt. J. Loutit (*The British Gardener's Director*, by J. Justice), Dr. D. T. MacDougal, Prof. C. Massalongo, Mr. W. R. Maxon (numerous *Contributions from the United States National Herbarium*, and other papers), Prof. T. G. B. Osborn, Dr. E. P. Phillips, Mr. T. A. Sprague (*Russia*, by D. Mackenzie Wallace, 2 vols., and a MS. *Flora of Timbuctu*, compiled from the works of Dr. Aug. Chevalier), Dr. R. Stockman, Mr. Gunnar Täckholm, Dr. J. C. Th. Uphof, and Mr. C. T. White.

Additions to the Herbarium during 1920.—During the year about 19,900 specimens were received as donations or exchanges and 12,499 purchased, while 2,828 were received on loan. The principal collections are enumerated below :—

Europe.—*Presented :* Britain : Cornish plants, by Mr. Edgar Thurston; British Rubi, by Mr. E. Langley; various British and continental plants, by Mr. C. E. Salmon; Pyrenees and Corsica, by Dr. Michel Gandoger; Austria, Kryptogamae exsiccatae, centuries 22–24, by Dr. A. Zahlbruckner; Macedonia, by Mr. Lyon V. Turner.

Purchased : Dr. H. Dahlstedt, Taraxaca Scandinavica Exsiccata, fascicle vi. 1; H. Sydow, Mycotheca Germanica, fascicles 25–27; Adr. Fiori and A. Béguinot, Flora Italica Exsiccata, centuries 23–24, and Xylotomotheca Italica, nos. 131–150; Dr. M. Gandoger, Crete and Syra. A. Leithe-Jasper, Tyrolese Cryptogamia.

Orient.—*Presented :* Mesopotamia, collected by members of the Baghdad Department of Agriculture, per Lt.-Col. R. J. D. Graham.

China.—*Presented:* Canton (C. O. Levine), by Mr. C. W. Howard; Chefoo, by Mr. N. H. Cowdry.

India.—*Presented:* British Lahul, Pangi and Garhwal, by Shiv Ram Kashyap: Assam, Abor Hills, by Mr. I. H. Burkill; Chamba State, by Mr. R. N. Parker; Dehra Dun, by Mr. S. H. Howard; Ootacamund, by Lady E. T. Bourne.

Malay Peninsula.—*Presented:* Vatious localities, by Mr. F. W. Foxworthy; Cryptogamia, by Mr. T. F. Chipp; Singapore Palms, F. Flippance, by Mr. H. N. Ridley; Fungi Malayana, century 6, by Mr. C. F. Baker.

Malaya.—*Presented:* Siam, by Dr. A. F. G. Kerr, Mrs. D. J. Collins and Mr. A. Marcan; Philippines, by Mr. E. D. Merrill; Borneo, Mt. Kinabalu, by Mr. Oakes Ames and Mr. E. D. Merrill; Java, by the Director of the Buitenzorg Botanic Garden; New Guinea, by Mr. C. T. White.

Purchased: A. D. E. Elmer, Philippines.

Australia.—*Presented:* Various localities, by Mr. J. H. Maiden and Mr. C. T. White.

Purchased: W. A. Weymouth, Tasmanian mosses.

New Zealand.—*Presented:* Mosses (Robert Brown), by Mr. George Brown; Ferns, &c., by Dr. Donald Petrie.

Polynesia.—*Presented:* Fiji, by Mr. William Greenwood.

Tropical Africa.—*Presented:* Gold Coast and Lagos, by Dr. J. M. Dalziel; Nigeria, Southern Provinces, by Mr. W. H. Johnson and Mr. P. A. Talbot; Congo Region, by Dr. E. De Wildeman, and Fungi (F. W. H. Migeod), by Messrs. Lever Bros.; Uganda, by Mr. R. A. Dummer, and the Mackie Ethnological Expedition (Coll. Rev. J. Roscoe); British East Africa, by Mr. W. J. Dowson; Masai Reserve (W. J. Dowson), by the Director of Agriculture, Nairobi; Portuguese Maiomhe, by Mr. J. Gossweiler; Rhodesia, by the Rhodesian Department of Agriculture, Mr. F. Eyles and Mr. A. Hislop.

Purchased: R. A. Dummer, Uganda.

Mascarene Islands.—*Presented:* Mauritius, by Mr. H. A. Tempany.

South Africa.—*Presented:* Transvaal, by Dr. I. B. Pole-Evans, Division of Botany, Department of Agriculture, Pretoria; Griqualand East, by Miss M. Wilman.

North America.—*Presented:* Grasses, centuries 5–7, by the United States Department of Agriculture; various, by the United States National Museum, per Dr. J. N. Rose.

Purchased: W. R. Smith, Canadian mosses.

Central America.—*Presented:* Costa Rica, by Mr. C. H. Lankester.

West Indies.—*Presented:* Jamaica, &c., by the Director-in-Chief, New York Botanical Garden; Dominica, by Mr. Joseph Jones.

South America.—*Presented :* Colombia, by Mr. M. T. Dawe, Mrs. I. A. Tracey and Dr. N. L. Britton; Juan Fernandez, by Dr. and Mrs. Skottsberg.

Purchased : Walter Fischer, Argentine.

Mr. Edgar Thurston, C.I.E., has presented the Cornish plants, collected during 1919, for incorporation in his Cornish herbarium now at Kew. Additional rare and critical British plants have been received from Mr. C. E. Salmon, F.L.S. Mr. E. Langley has contributed an interesting set of Bedfordshire Rubi named by the Rev. W. Moyle Rogers. A large collection from Mesopotamia made by the members of the Baghdad Department of Agriculture has been received from Lt.-Col. R. J. D. Graham. Mr. N. H. Cowdry has sent a continuation of his Chinese collections, this year made in the neighbourhood of Chefoo. Lady E. T. Bourne has presented plants collected in Octacamund since the presentation by her and Sir A. G. Bourne in 1915 of their Indian herbarium. Various critical plants for determination have been received from the Forestry College and Institute, Dehra Dun, through Mr. S. H. Howard. Mr. R. N. Parker has sent several collections made by him in the Chamba State. Major T. F. Chipp, Assistant Director of the Botanic Gardens, Singapore, has forwarded Cryptogamia collected by him in the Malay Peninsula. Collecting in that region by Mr. F. W. Foxworthy and others has also been going on actively under the auspices of the Director of Museums, Federated Malay States, collections having been made in Pahang, Selangor and Negri Sembilan. In Siam, Dr. A. F. G. Kerr, after being on active military service in Europe, has resumed collecting in the district of Bangkok. Mr. E. D. Merrill has sent a large collection of Philippine plants, including 975 fungi, also 1,062 specimens of plants recorded in his " Species Blancoanae," published in Manila in 1918; he has also presented a collection made on Mt. Kinabalu, by Mrs. Clemens, from which locality orchids have been received from Mr. Oakes Ames. The Director of the Botanic Garden, Buitenzorg, has communicated an interesting collection of Javanese plants. Mr. J. H. Maiden, Director of the Botanic Garden, Sydney, has presented Australian plants, especially new or critical species of Acacia and Eucalyptus. Mr. W. Greenwood has forwarded the collections of flowering plants and mosses made by him in Fiji. Tropical Africa has yielded many collections, amongst them being Rhodesian grasses from Mr. F. Eyles, plants from the Congo region by Dr. E. De Wildeman and those collected by the Rev. J. Roscoe during the Mackie Ethnological Expedition. Dr. I. B. Pole-Evans has continued to send South African plants, including a collection made by Dr. E. P. Phillips at Bethlehem, in the Orange River Colony. Ferns collected in Juan Fernandez by Dr. and Mrs. Skottsberg, on which a report was recently published, have been presented by the collectors. Mrs. E. G. Britton has continued to send interesting mosses from the Herbarium of W. Mitten.

A valuable set of photographs taken in Japan by Mr. E. H. Wilson have been purchased from Prof. C. S. Sargent.

Deficiencies in the collection of portraits of botanists and botanical collectors have been remedied by Dr. W. Rushton Parker, who has presented photographs of pictures in the National Portrait Gallery and elsewhere.

Botany of Juan Fernandez and Easter Island.*—A recently published report on the collections made by Dr. and Mrs. Skottsberg during the Swedish Expedition to Patagonia and Terra del Fuego in 1916 and 1917 contains three papers dealing respectively with (1) the Pteridophyta of the Juan Fernandez Islands; (2) the Ferns of Easter Island; and (3) the Myxomycetes of Juan Fernandez. The two first are by C. Christensen and C. Skottsberg, and the last by R. E. Fries. Up to 1908, 42 species had been recorded from Juan Fernandez, while the number now known is 51, of which 17 are endemic, and 2 species, known elsewhere, are represented by endemic varieties. One genus, *Thyrsopteris*, is endemic and does not occur at altitudes below 400 metres; for an account of this plant see *Kew Bulletin*, 1915, p. 295. Of the species recorded outside Juan Fernandez, 27 are also found on the continent of South America, 5 in tropical America, 6 in the Falkland Islands, 5 in New Zealand, and 5 on the Australian continent. Three others occur on islands in the southern ocean. Three are of wide distribution, viz.: — *Cystopteris fragilis*, Bernh., almost cosmopolitan; *Polypodium lanceolatum*, L., throughout the tropics, and *Elaphoglossum Lindenii*, T. Moore, tropical America. Some species also found in the Falkland Islands attain a high altitude in Juan Fernandez, two being found up to 1,370 metres, while *Serpyllopsis caespitosa*, C. Chr., and *Adiantum chilense*, Kaulf., extend up to 1,400 metres, the last named also going down to sea level.

Easter Island was visited in June, 1917, when all the ferns previously recorded were again collected as well as five additional ones, bringing the total for the island up to 12. Two are endemic; one of these, *Dryopteris Espinosai*, Hicken, had previously been collected by Mr. F. Fuentes; the other proved to be a new species, *Doodia paschalis*, allied to the Australian *D. blechnoides*, A. Cunn. Most of the other species have a wide distribution, and are of a more tropical type than those from Juan Fernandez, though the latter is only about 5° further south.

Thirteen genera of *Myxomycetes*, comprising 18 species, are enumerated from Juan Fernandez by Dr. R. E. Fries. None of these is endemic.

The report is illustrated by 5 plates and several text figures.

C. H. W.

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* *The Natural History of Juan Fernandez and Easter Island*, edited by Dr. Carl Skottsberg. Vol. II., Botany. Part i. Uppsala, 1920. Almqvist & Wiksells. 250 Swedish crowns.